AUTHENTICATED
U.S. GOVERNMENT
INFORMATION
GPO

Union Calendar No. 489

104th Congress, 2d Session – – – – – – – – – – – – – House Report 104–887

SUMMARY OF ACTIVITIES

OF THE

COMMITTEE ON SCIENCE
U.S. HOUSE OF REPRESENTATIVES

FOR THE

ONE HUNDRED FOURTH CONGRESS

JANUARY 2, 1997

JANUARY 2, 1997.—Committed to the Committee of the Whole House on the State of the Union and ordered to be printed

U.S. GOVERNMENT PRINTING OFFICE
39–006 WASHINGTON : 1997

COMMITTEE ON SCIENCE

ROBERT S. WALKER, Pennsylvania, *Chairman*

F. JAMES SENSENBRENNER, JR., Wisconsin
SHERWOOD L. BOEHLERT, New York
HARRIS W. FAWELL, Illinois
CONSTANCE A. MORELLA, Maryland
CURT WELDON, Pennsylvania
DANA ROHRABACHER, California
STEVEN H. SCHIFF, New Mexico
JOE BARTON, Texas
KEN CALVERT, California
BILL BAKER, California
ROSCOE G. BARTLETT, Maryland
VERNON J. EHLERS, Michigan**
ZACH WAMP, Tennessee
DAVE WELDON, Florida
LINDSEY O. GRAHAM, South Carolina
MATT SALMON, Arizona
THOMAS M. DAVIS, Virginia
STEVE STOCKMAN, Texas
GIL GUTKNECHT, Minnesota
ANDREA H. SEASTRAND, California
TODD TIAHRT, Kansas
STEVE LARGENT, Oklahoma
VAN HILLEARY, Tennessee
BARBARA CUBIN, Wyoming
MARK ADAM FOLEY, Florida
SUE MYRICK, North Carolina

GEORGE E. BROWN, JR., California RMM*
HAROLD L. VOLKMER, Missouri
RALPH M. HALL, Texas
BART GORDON, Tennessee
JAMES A. TRAFICANT, JR., Ohio
JOHN S. TANNER, Tennessee
TIM ROEMER, Indiana
ROBERT E. (Bud) CRAMER, JR., Alabama
JAMES A. BARCIA, Michigan
PAUL McHALE, Pennsylvania
JANE HARMAN, California
EDDIE BERNICE JOHNSON, Texas
DAVID MINGE, Minnesota
JOHN W. OLVER, Massachusetts
ALCEE L. HASTINGS, Florida
LYNN N. RIVERS, Michigan
KAREN McCARTHY, Missouri
MIKE WARD, Kentucky
ZOE LOFGREN, California
LLOYD DOGGETT, Texas
MICHAEL F. DOYLE, Pennsylvania
SHEILA JACKSON LEE, Texas
WILLIAM P. LUTHER, Minnesota

DAVID D. CLEMENT, *Chief of Staff and Chief Counsel*
BARRY BERINGER, *General Counsel*
TISH SCHWARTZ, *Chief Clerk and Administrator*
ROBERT E. PALMER, *Democratic Staff Director*

LETTER OF TRANSMITTAL

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE,
Washington, DC, January 2, 1997.

Hon. ROBIN H. CARLE,
The Clerk, U.S. House of Representatives,
Washington, DC.

DEAR MS. CARLE: In compliance with Rule XI, Clause 1(d) of the Rules of the House of Representatives, I hereby submit the Summary of Activities of the Committee on Science for the 104th Congress.

The purpose of this report is to provide the Members of the House of Representatives, as well as the general public, with an overview of the legislative and oversight activities conducted by this Committee, as defined by Rule X, Clause 1(n) of the Rules of the House of Representatives.

This document is intended as a general reference tool, and not as a substitute for the hearing records, reports, and other committee files.

Sincerely,

ROBERT S. WALKER,
Chairman.

Enclosure.

CONTENTS

	Page
Committee History	1
Chapter I—Legislative Activities of the Committee on Science	9
1.1—P.L. 104-113, National Technology Transfer and Advancement Act of 1995 (H.R. 2196/S. 1164)	9
1.2—P.L. 104-182, Safe Drinking Water Act Amendments of 1996 (S. 1316/H.R. 3604)	12
1.3—P.L. 104-201, National Defense Authorization Act for FY 1997 (H.R. 3230)	13
1.4—P.L. 104-227, Antarctic Science, Tourism, and Conservation Act of 1996 (H.R. 3060/S. 1645)	14
1.5—P.L. 104-264, Federal Aviation Reauthorization Act of 1996 (Title XI of H.R. 3539/Title VII of H.R. 3322/H.R. 3484	15
1.6—P.L. 104-271, Hydrogen Future Act of 1996 (H.R. 655/H.R. 4138)	17
1.7—P.L. 104-289, Savings in Construction Act of 1996 (H.R. 2779)	19
1.8—P.L. 104-332, National Invasive Species Act of 1996 (H.R. 4283/H.R. 3217)	20
Chapter II—Other Legislative Activities of the Committee on Science	23
2.1—Risk Assessment and Cost-Benefit Act of 1995 (H.R. 9/H.R. 1022)	23
2.2—National Sea Grant College Program (H.R. 1175)	27
2.3—International Space Station Authorization Act of 1995 (H.R. 1601)	28
2.4—Department of Commerce Dismantling Act (H.R. 1756)	29
2.5—Environmental Research, Development, and Demonstration Authorization Act of 1995 (H.R. 1814)	32
2.6—National Oceanic and Atmospheric Administration Authorization Act of 1995 (H.R. 1815)	33
2.7—Department of Energy Civilian Research and Development Act of 1995 (H.R. 1816)	35
2.8—Fire Administration Authorization Act of 1995 (H.R. 1851)	37
2.9—National Science Foundation Authorization Act of 1995 (H.R. 1852)	39
2.10—American Technology Advancement Act of 1995 (H.R. 1870)	41
2.11—National Aeronautics and Space Administration Authorization Act, FY 1996 (H.R. 2043)	42
2.12—Omnibus Civilian Science Authorization Act of 1995 (H.R. 2405)	45
2.13—National Oceanographic Partnership Act (H.R. 3303) (Also see P.L. 104-201/H.R. 3230 in Chapter I)	45
2.14—Omnibus Civilian Science Authorization Act of 1996 (H.R. 3322)	48
2.15—Space Commercialization Promotion Act of 1996 (H.R. 3936)	56
Chapter III—Other Measures Discharged by the Committee on Science	59
3.1—Propane Education and Research Act of 1995 (H.R. 1514/P.L. 104-284)	59
3.2—Water Desalination Act of 1996 (S. 811/P.L. 104-298)	59

Page

Chapter IV—Oversight, Investigations and Other Activities of the Committee on Science, Including Selected Subcommittee Legislative Activities 61

4.1 Committee on Science 61

4.1(a)—Is Today's Science Policy Preparing Us for the Future? 61
4.1(b)—Restructuring of the Federal Scientific Establishment 62
4.1(c)—Educational Technology in the 21st Century 64
4.1(d)—U.S. Japanese Cooperation in Human Space Flight 66
4.1(e)—NASA Purchasing in the Earth-Space Economy 67
4.1(f)—Allocating Federal Funds for Science and Technology 70
4.1(g)—U.S. Global Change Research Programs: Data Collection and Scientific Priorities 71
4.1(h)—Civilian Science Agencies' Implementation of the Government Performance and Results Act 73
4.1(i)—The Effects of the Six-Year Balanced Budget on Civilian R&D 76
4.1(j)—Technological Solutions to Improve Aviation Security 79

4.2 Subcommittee on Basic Research 82

4.2(a)—The 1996 National Science Foundation Authorization, Parts I and II 82
4.2(b)—Alternative Futures of the Department of Energy National Laboratories: "The Galvin Report" and "National Laboratories Need Clearer Missions and Better Management, A GAO Report to the Secretary of Energy." 84
4.2(c)—U.S. Fire Administration FY 1996 Budget Request 87
4.2(d)—Science, Environment, and Technology Summit: A Long Term National Science Strategy 88
4.2(e)—Federal Technology Transfer Policies and Our Federal Laboratories: Methods for Improving Incentives for Technology Transfer At Federal Laboratories 90
4.2(f)—Graduate Level Science and Engineering Education 93
4.2(g)—Cyberporn: Protecting Our Children from the Back Alleys of the Internet 95
4.2(h)—Restructuring the Federal Scientific Establishment: Future Missions and Governance for the Department of Energy, National Laboratories, H.R. 87, H.R. 1510, H.R. 1993 (Title II), and H.R. 2142 97
4.2(i)—The National Earthquake Hazards Reduction Program 103
4.2(j)—The High Performance Computing and Communications Program . 105
4.2(k)—Department of Energy National Laboratory Restructuring 107
4.2(l)—Partnership for Advanced Computational Infrastructure Program . 110
4.2(m)—National Science Foundation Fiscal Year 1997 Authorization 114
4.2(n)—Government-University-Industry Collaboration: The Future of U.S. Research and Development 115
4.2(o)—The Use of Educational Technology and Human Resource Programs To Enhance Science, Math, and Technology Literacy 117
4.2(p)—The Future of Antarctic Research 120

Page

4.3 Subcommittee on Energy and Environment 123

4.3(a)—Federal Energy and Environment Research and Development: Setting New Priorities for the Department of Energy, Environmental Protection Agency, and the National Oceanographic and Atmospheric Administration 123

4.3(b)—Alternative Futures for the Department of Energy National Laboratories: "The Galvin Report" and "National Laboratories Need Clearer Missions and Better Management, A GAO Report to the Secretary of Energy" 131

4.3(c)—Restructuring the Federal Scientific Establishment: Future Missions and Governance for DOE National Laboratories, H.R. 87, H.R. 1510, H.R. 1993 (Title II), and H.R. 2142 134

4.3(d)—Scientific Integrity and Public Trust: The Science Behind Federal Policies and Mandates, Case Study 1—Stratospheric Ozone: Myths and Realities 140

4.3(e)—Next Generation Weather Radar (NEXRAD): Are We Covered? 144

4.3(f)—Scientific Integrity and Public Trust: The Science Behind Federal Policies and Mandates, Case Study 2—Climate Models and Projections of Potential Impacts of Global Climate Change 147

4.3(g)—Superfund Research and Development: The Role of R&D Within A Reformed Superfund 151

4.3(h)—Scientific Integrity and Public Trust: The Science Behind Federal Policies and Mandates, Case Study 3—EPA's Dioxin Reassessment 152

4.3(i)—Leveraging National Oceanographic Capabilities 155

4.3(j)—National Weather Service Modernization Status 158

4.3(k)—DOE's Restructured Fusion Energy Sciences Program 160

4.3(l)—U.S. Energy Outlook and Implications for Research and Development 165

4.3(m)—FY 1997 Budget Request for DOE, NOAA, EPA, and Safe Drinking Water R&D 167

4.3(n)—DOE's FY 1997 Budget Request for Energy Efficiency and Renewable Energy and Fossil Energy Programs 169

4.3(o)—DOE's FY 1997 Budget Request for Environment, Safety and Health, Environmental Restoration and Waste Management (Non-Defense) and Nuclear Energy 172

4.3(p)—Changes in U.S. Patent Law and Their Implications for Energy and Environment R&D 175

4.3(q)—DOE's FY 1997 Budget Request for the Office of Energy Research (OER) 179

4.3(r)—Environmental Regulation: A Barrier to the Use of Environmental Technology 182

4.3(s)—Partnership for a New Generation of Vehicles (PNGV): Assessment of Program Goals, Activities, and Priorities 185

4.3(t)—Funding DOE R&D in a Constrained Budget Environment 190

4.4 Subcommittee on Space and Aeronautics 194

4.4(a)—FY 1996 NASA Authorization 194

4.4(b)—The Space Shuttle Program In Transition: Keeping Safety Paramount 197

4.4(c)—The X-33 Reusable Launch Vehicle: A New Way of Doing Business? 199

4.4(d)—The Space Shuttle Program In Transition: Keeping Safety Paramount—Part II 200

4.4(e)—Shuttle Single Prime Contract: A Review of NASA's Determination and Findings 201

4.4(f)—NASA Posture Hearing 203

4.4(g)—Fiscal Year 1997 NASA Authorization 204

4.4(h)—U.S. Space Launch Strategy 209

4.4(i)—NASA's Uncosted Carry-over 210

4.4(j)—Space Commercialization Promotion Act of 1996 211

4.4(k)—Life on Mars? 213

Page

4.5 Subcommittee on Technology 214

4.5(a)—GAO Report on Cholesterol Measurement Testing Standards and Accuracy 214

4.5(b)—Technology Administration/National Institute of Standards and Technology 215

4.5(c)—FAA Research and Acquisition Management 217

4.5(d)—Federal Technology Transfer Policies and Our Federal Laboratories: Methods for Improving Incentives for Technology Transfer at Federal Laboratories 218

4.5(e)—Maintaining Our International Competitiveness: The Importance of Standards and Conformity Assessment on Industry 221

4.5(f)—Cyberporn: Protecting Our Children from the Back Alleys of the Internet 223

4.5(g)—The Impact of Government Regulatory, Tax and Legal Policy on Technology Development and Competitiveness 225

4.5(h)—The Malcolm Baldrige National Quality Awards Program: An Oversight Review from Its Inception 227

4.5(i)—Medical Technology Development and Commercialization 229

4.5(j)—An Industry Perspective of FAA R&D Programs 231

4.5(k)—Rail Safety Oversight: High Technology Train Control Devices 233

4.5(l)—Authorization Hearing of the Technology Administration/National Institute of Standards and Technology for FY 1997 235

4.5(m)—FAA Research, Engineering, and Development Fiscal Year 1997 Authorization and Management Reform 236

4.5(n)—Oversight Review of Research Laboratory Programs at NIST 237

4.5(o)—Solving the Year 2000 Software Problem: Creating Blueprints for Success 239

4.5(p)—Proposed Amendments to the Metric Conversion Act 240

4.5(q)—The Increasing Importance of International Standards to the U.S. Industrial Community and the Impact of ISO 14000 243

4.5(r)—Patent System and Modern Technology Needs: Meeting the Challenge of the 21st Century 245

4.5(s)—Environmental Regulation: A Barrier to the Use of Environmental Technology 247

4.5(t)—Oversight Review of Research Laboratory Programs at NIST 250

4.5(u)—Solving the Year 2000 Computer Problems 251

4.5(v)—Technological Advances in Genetics Testing: Implications for the Future 253

APPENDIX

List of Publications of the Committee on Science (104th Congress) 256

Union Calendar No. 489

104TH CONGRESS, 2d Session } HOUSE OF REPRESENTATIVES { REPORT 104–887

SUMMARY OF ACTIVITIES—COMMITTEE ON SCIENCE

JANUARY 2, 1997.—Committed to the Committee of the Whole House on the State of the Union and ordered to be printed

Mr. WALKER, from the Committee on Science, submitted the following

REPORT

HISTORY OF THE COMMITTEE ON SCIENCE

The Committee on Science has its roots in the intense reaction to the Soviet launch of Sputnik on October 4, 1957. Early in 1958 Speaker Sam Rayburn convened the House of Representatives, and the first order of the day was a resolution offered by Majority Leader John McCormack of Massachusetts. It read, "Resolved that there is hereby created a Select Committee on Astronautics and Space Exploration . . . "

The Select Committee performed its tasks with both speed and skill by writing the Space Act creating the National Aeronautics and Space Administration and chartering the permanent House Committee on Science and Astronautics, now known as the Committee on Science, Space, and Technology, with a jurisdiction comprising both science and space.

The Science and Astronautics Committee became the first standing Committee to be established in the House of Representatives since 1946. It was also the first time since 1892 that the House and Senate had acted to create standing Committees in an entirely new area.

The Committee officially came into being on January 3, 1959, and on its 20th Anniversary the Honorable Charles Mosher said, the Committee "was born of an extraordinary House-Senate joint leadership initiative, a determination to maintain American preeminence in science and technology, . . . "

The formal jurisdiction of the Committee on Science and Astronautics included outer space, both exploration and control, astronautical research and development, scientific research and develop-

ment, science scholarships, and legislation relating to scientific agencies, especially the National Bureau of Standards, the National Aeronautics and Space Administration, the National Aeronautics and Space Council and the National Science Foundation.

The Committee retained this jurisdiction from 1959 until the end of the 93rd Congress in 1974. While the Committee's original emphasis in 1959 was almost exclusively astronautics, over this 15-year period the emphasis and workload expanded to encompass scientific research and development in general.

In 1974, a Select Committee on Committees, after extensive study, recommended several changes to the organization of the House in H. Res. 988, including expanding the jurisdiction of the Committee on Science and Astronautics, and changing its name to the Committee on Science and Technology.

To the general realm of scientific research and development was added energy, environmental, atmospheric, and civil aviation R&D, and also jurisdiction over the National Weather Service.

In addition to these legislative functions, the Committee on Science and Technology was assigned a "special oversight" function, giving it the exclusive responsibility among all Congressional standing Committees to review and study, on a continuing basis, all laws, programs and government activities involving federal nonmilitary research and development.

In 1977, with the abolition of the Joint Committee on Atomic Energy, the Committee was further assigned jurisdiction over civilian nuclear research and development thereby rounding out its jurisdiction for all civilian energy R&D.

A Committee's jurisdiction gives it both a mandate and a focus. It is, however, the Committee's Chairman that gives it a unique character. The Committee on Science and Technology has had the good fortune to have had five very talented and distinctly different Chairmen, each very creative in his own way in directing the Committee's activities.

Congressman Overton Brooks was the Science and Astronautics Committee's first Chairman, and was a tireless worker on the Committee's behalf for the 2½ years he served as Chairman.

When Brooks convened the first meeting of the new Committee in January of 1959, Committee Member Ken Hechler recalled, "There was a sense of destiny, a tingle of realization that every member was embarking on a voyage of discovery, to learn about the unknown, to point powerful telescopes toward the cosmos and unlock secrets of the universe, and to take part in a great experiment." With that spirit the Committee began its work.

Brooks worked to develop closer ties between the Congress and the scientific community. On February 2, 1959, opening the first official hearing of the new Committee Chairman Brooks said, "Although perhaps the principal focus of the hearings for the next several days will be on astronautics, it is important to recognize that this Committee is concerned with scientific research across the board." And so, from the beginning, the Committee was concerned with the scope of its vision.

Overton Brooks died of a heart attack in September of 1961, and the chairmanship of the Committee was assumed by Congressman George Miller of California.

Miller, a civil engineer, was unique among Members of Congress who rarely come to the legislature with a technical or scientific background. He had a deep interest in science, and his influence was clearly apparent in the broadening of the charter of the National Science Foundation and the establishment of the Office of Technology Assessment. He pioneered in building strong relationships with leaders of science in other nations. This work developed the focus for a new Subcommittee established during his chairmanship, known as the Subcommittee on Science, Research and Development.

Just a few months before Miller became Chairman, President John F. Kennedy announced to a joint session of Congress the national commitment to land a man on the moon and return him safely to Earth before the end of the decade. Thus, during Miller's 11-year tenure as Chairman, the Committee directed its main efforts toward the development of the space program.

Chairman Miller was not reelected in the election of 1972, so in January of 1973, Olin E. Teague of Texas took over the helm of the Committee. Teague, a man of directness and determination, was a highly decorated hero of the second World War. He was a longstanding Member of Congress and Chairman of the Veterans Committee before taking over the chairmanship of the Science and Technology Committee.

Throughout the 1960's and early 1970's, Teague chaired the Science Committee's Manned Space Flight Subcommittee, and in that capacity firmly directed the efforts to send a man to the moon.

As Chairman of the Committee, Teague placed heavy emphasis on educating the Congress and the public on the practical value of space. He also prodded NASA to focus on the industrial and human applications of the space program.

One of Teague's first decisions as Chairman was to set up a Subcommittee on Energy. During his six-year leadership of the Committee, energy research and development became a major part of the Committee's responsibilities.

In 1976, Chairman Teague saw the fruition of three years of intensive Committee work to establish a permanent presence for science in the White House. The Office of Science and Technology Policy was established with a Director who would also serve as the President's Science Advisor.

Throughout his leadership, he voiced constant concern that the complicated technical issues the Committee considered be expressed in clear and simple terms so that Members of Congress, as well as the general public, would understand the issues.

After six years as Chairman, Teague retired from the Committee and the Congress due to serious health problems. He was succeeded by Don Fuqua, a Representative from northern Florida.

Fuqua became Chairman on January 24, 1979, at the beginning of the 96th Congress and was the youngest Member to succeed to the Committee's chairmanship.

Don Fuqua came to the Congress after two terms in the Florida State Legislature and was, at age 29, the youngest Democrat in Congress when he was elected in 1962.

Fuqua's experience on the Committee dated back to the first day of his Congressional service. Since 1963, he had served as a mem-

ber of the Committee's Manned Space Flight Subcommittee. When Olin Teague became Chairman of the Committee in 1973, Fuqua took Teague's place as Chairman of the Subcommittee.

As the Subcommittee Chairman he was responsible for major development decisions on the Space Shuttle and the successful Apollo-Soyuz link-up in space between American astronauts and Soviet cosmonauts. Later, the Subcommittee's responsibility was expanded to cover all other NASA activities and was renamed the Subcommittee on Space Science and Applications.

As Chairman of the Committee, Fuqua's leadership could be seen in the expansion of Committee activities to include technological innovation, science and math education, materials policy, robotics, technical manpower, and nuclear waste disposal. He worked to strengthen the Committee's ties with the scientific and technical communities to assure that the Committee was kept abreast of current developments, and could better plan for the future.

During the 99th Congress, the Science and Technology Committee, under Fuqua's chairmanship, carried out two activities of special note.

The first was the initiation of a study of the nation's science policy encompassing the 40-year period between the end of the second World War and the present. The intent was to identify strengths and weaknesses in our nation's science network. At the end of the 99th Congress, Chairman Fuqua issued a personal compilation of essays and recommendations on American science and science policy issues in the form of a Chairman's Report.

The second activity was a direct outgrowth of the Space Shuttle "Challenger" accident of January 28, 1986. As part of the Committee's jurisdictional responsibility over all the NASA programs and policies, a steering group of Committee members, headed by Congressman Robert Roe, the Ranking Majority Member, conducted an intensive investigation of the Shuttle accident. The Committee's purpose and responsibility were not only the specific concern for the safe and effective functioning of the Space Shuttle program, but the larger objective of insuring that NASA, as the nation's civilian space agency, maintain organizational and programmatic excellence across the board.

Chairman Fuqua announced his retirement from the House of Representatives at the termination of the 99th Congress. He served 24 years on the Committee on Science and Technology and 8 years as its Chairman.

Congressman Robert A. Roe of New Jersey, a long-time member of the Committee, became its new Chairman at the beginning of the 100th Congress. With this fifth Chairman, the Committee was once again presided over by an individual with professional technical expertise. Congressman Roe was trained as an engineer and brought that broad knowledge and understanding to bear on the Committee's issues from the first day of his tenure.

Congressman Roe's first official act as Chairman was to request a change in the Committee's name from the Committee on Science and Technology to the Committee on Science, Space, and Technology. This change was designed not only to reflect the Committee's broad space jurisdiction, but also to convey the importance of space exploration and development to the nation's future.

In the 100th Congress, under Chairman Roe's stewardship, the Committee kept close scrutiny over NASA's efforts to redesign and reestablish the space shuttle program. The successful launch of the Shuttle Discovery in September, 1988 marked America's return to space after 32 months without launch capability.

The vulnerability of having the nation's launch capability concentrated singularly in the Space Shuttle, and the rapid increase of foreign competition in commercial space activities, precipitated strong Committee action to help ensure the competitive posture of the nation's emerging commercial launch industry.

Chairman Roe's leadership to stabilize and direct the nation's space program led to the Committee's first phase of multi-year authorizations for research and development programs with the advent of three year funding levels for the Space Station.

Within the national movement to improve America's technological competitiveness, Chairman Roe headed the Committee's initiative to expand and redefine the mission of the National Bureau of Standards in order for it to aid American industry in meeting global technological challenges.

The Science Committee has a long tradition of alerting the Congress and the nation to new scientific and technological opportunities that have potential to create dramatic economic or societal change. Among these have been recombinant DNA research and supercomputer technology. In the 100th Congress, members of the Committee included the new breakthroughs in superconductivity research in this category.

Several long-term efforts of the Committee came to fruition during the 101st Congress. As the community of space-faring nations expanded, and as space exploration and development moved toward potential commercialization in some areas, the need arose for legal certainty concerning intellectual property rights in space. Legislation long advocated by the Science Committee defining the ownership of inventions in outer space became public law during this Congress.

Continuing the Committee's interest long range energy research programs for renewable and alternative energy sources, a national hydrogen research and development program was established to lead to economic production of hydrogen from renewable resources its use as an alternative fuel.

At the end of the 101st Congress, the House Democratic Caucus voted Representative Roe Chairman of the Public Works and Transportation Committee to fill the vacancy in that Committee's Chairmanship.

Congressman Roe, who served as Chairman of the Science, Space, and Technology Committee for the 100th and the 101st Congresses, brought a leadership style of high energy and strong enthusiasm to the Committee. He was known for his tenacious commitment to understanding an issue down to its smallest detail.

The hallmark of Representative Roe's four-year tenure as Chairman was his articulation of science, space, and technology as the well-spring for generating the new wealth for America's future economic growth and long-term security.

At the beginning of the 102nd Congress in January, 1991, Representative George E. Brown, Jr. of southern California became the

sixth Chairman of the Science, Space, and Technology Committee. He was the third Chairman, among the six, to bring scientific or technical experience to the position. Trained in industrial physics, Brown worked as a civil engineer for many years before entering politics.

Elected to the Congress in 1962, Brown has been a member of the Science, Space, and Technology Committee since 1965. During his more than two decade tenure on the Committee before becoming its Chairman, he chaired Subcommittees on the environment, on research and technology, and on transportation and aviation R&D.

Whether from his insightful leadership as a Subcommittee Chairman or from the solitary summit of a futurist, Brown brought a visionary perspective to the Committee's dialogue by routinely presenting ideas far ahead of the mainstream agenda.

George Brown talked about conservation and renewable energy sources, technology transfer, sustainable development, environmental degradation, and an agency devoted to civilian technology when there were few listeners and fewer converts. He tenaciously stuck to these beliefs and time has proven his wisdom and clairvoyance.

Consistent with his long-held conviction that the nation needed a coherent technology policy, Brown's first action as Chairman was to create a separate Subcommittee for technology and competitiveness issues. During his initial year as Chairman, Brown developed an extensive technology initiative which was endorsed by the House of Representatives in the final days of the 102nd Congress. The work articulated Brown's concept of a partnership between the public and private sectors to improve the nation's competitiveness.

The culmination of the 102nd Congress saw Brown's persistent efforts to redirect our national energy agenda come to fruition. The first broad energy policy legislation enacted in over a decade included a strong focus on conservation, renewable energy sources, and the expanded use of non-petroleum fuels, especially in motor vehicles.

In Brown's continuing concern to demonstrate the practical application of advances in science and technology, he instituted the first international video-conferenced meetings in the U.S. Congress. In March of 1992, members of the Science Committee exchanged ideas on science and technology via satellite with counterparts from the Commonwealth of Independent States. This pilot program in the House of Representatives resulted in a decision to establish permanent in-house capacity for video-conferencing for the House.

As a final activity in the 102nd Congress, Brown issued a Chairman's Report on the federally funded research enterprise. The work will serve as the starting point for a comprehensive review and revision of federal science policy currently in the planning stage.

The 1994 Congressional elections turned over control of the Congress to the Republican party. The House Republican Conference acted to change the official name of the Committee from the Committee on Science, Space, and Technology, to the Committee on Science. Robert S. Walker of Pennsylvania became the Science Committee's first Republican Chairman, and the seventh Committee Chairman. Walker had served on the Science Committee since

his election to Congress in 1976, and had been the Ranking Member since 1989.

Chairman Walker acted to streamline the Subcommittee structure from five to four Subcommittees: Basic Research, Energy and Environment, Space and Aeronautics, and Technology. This action reflected the new Congress' mandate to increase efficiency and cut expenses, and also reflected Walker's personal desire to refocus the Committee's work. Due to the reduction in the number of Subcommittees and a sharper focus on the issues, the number of hearings was reduced, while the number of measures passed by the House and signed into law increased.

Chairman Walker chose to use the Full Committee venue to hold hearings exploring the role of science and technology in the future. The first hearing, "Is Today's Science Policy Preparing Us for the Future?" served as the basis for much of the Committee's work during the 104th Congress.

For the first time in recent Science Committee history, every agency under the Committee's jurisdiction was authorized. To preserve and enhance the core federal role of creating new knowledge for the future, the Science Committee sought to prioritize basic research policies. In order to do so, the Committee took strong, unprecedented action by applying six criteria to civilian R&D:

(1) Federal R&D efforts should focus on long-term, non-commercial R&D, leaving economic feasibility and commercialization to the marketplace.

(2) All R&D programs should be relevant and tightly focused to the agencies' missions.

(3) Government-owned laboratories should confine their in-house research to areas in which their technical expertise and facilities have no peer and should contract out other research to industry, private research foundations and universities

(4) The Federal Government should not fund research in areas that are receiving, or should reasonably be expected to obtain, funding from the private sector.

(5) Revolutionary ideas and pioneering capabilities that make possible the impossible should be pursued within controlled, performance-based funding levels.

(6) Federal R&D funding should not be carried out beyond demonstration of technical feasibility. Significant additional private investment should be required for economic feasibility, commercial development, production and marketing.

The authorization bills produced by the Science Committee reflected those standards, thereby protecting basic research and emphasizing the importance of science as a national issue. As an indication of the Science Committee's growing influence, the recommendations and basic science programs were prioritized accordingly.

During the 104th Congress, the Science Committee's oversight efforts were focused on exploring ways to make government more efficient; improve management of taxpayer resources; expose waste, fraud and abuse; and give the United States the technological edge into the 21st Century.

CHAPTER I—LEGISLATIVE ACTIVITIES OF THE COMMITTEE ON SCIENCE

During the 104th Congress, 83 bills were referred to the Committee on Science. Committee interests were incorporated at the conference stage on 4 measures; 16 legislative reports were filed in the House; 9 measures passed the House; 8 measures were incorporated into an omnibus authorization bill which passed the House; and 4 measures were enacted.

1.1—P.L. 104-113, NATIONAL TECHNOLOGY TRANSFER AND ADVANCEMENT ACT OF 1995 (H.R. 2196/S.1164)

Background and summary of legislation

Many of the United States' economic advances of the new millennium will be rooted in the research and development performed in our laboratories today. Our nation's future well-being, therefore, becomes dependent on the continuous transfer of basic science and technology from our laboratories in the United States, including our federal laboratories, to the private sector to create commercial goods and services. Successful technology transfer results in the creation of innovative products or processes becoming available to meet or induce market demand.

Congress has long tried to encourage transfer to the private sector of unclassified technology created in our federal laboratories. This is eminently logical since federal laboratories are considered one of our nation's greatest assets; yet, they are also a largely untapped resource of technical expertise. The United States has over 700 federal laboratories, employing one of six scientists in the nation and occupying one-fifth of the country's lab and equipment capabilities. It is, therefore, important to our future economic well-being to make the ideas and resources of our federal laboratory scientists available to United States companies for commercialization opportunities.

By permitting effective collaboration between our federal laboratories and private industry, new technologies and industrial innovation can be effectively commercialized and brought into the broader economy, thus enhancing our nation's ability to compete in the global marketplace. To help further this goal, Congress first enacted the Stevenson-Wydler Technology Innovation Act of 1980 (P.L. 96-480). The Stevenson-Wydler Act required federal laboratories to take an active role in technical cooperation and established technology transfer offices at all major federal laboratories. That landmark legislation expanded considerably with the Federal Technology Transfer Act of 1986 (P.L. 99-502) and the National Competitiveness Technology Transfer Act of 1989 (P.L. 101-189).

The Federal Technology Transfer Act of 1986 allowed a government-owned, government-operated (GOGO) laboratory staffed by

federal employees to enter into a Cooperative Research and Development Agreement (CRADA) with industry, universities, and others. The CRADA mechanism allows a laboratory and an industrial company to negotiate patent rights and royalties before they conduct joint research, giving the company patent protection for any inventions and products that result from the collaboration. This patent protection provides an incentive for the companies to invest in turning laboratory ideas into commercial products. Furthermore, if a federal laboratory negotiates the payment of royalties as part of a CRADA arrangement, the Federal Technology Transfer Act of 1986 provides that part of those royalties are shared with the federal inventor as a reward for his or her work and as an incentive to them and others to report and assist in the transfer of potentially valuable inventions. A CRADA also provides a federal laboratory with valuable insights into the needs and priorities of industry, and with the expertise available only in industry, that enhances a laboratory's ability to accomplish its mission.

The National Competitiveness Technology Transfer Act of 1989, included as Section 3131 et seq. of the Department of Defense Authorization Act for Fiscal Year 1990 (P.L. 101-189), extended the CRADA authority to a government-owned, contractor-operated (GOCO) laboratory such as the Department of Energy laboratories. It also protected information and innovations, brought into and created through a CRADA, from disclosure.

Since the inception in 1986 of the CRADA legislation, over 2,000 agreements have been signed, resulting in the transfer of technology, knowledge, and expertise back and forth between our federal laboratories and the private sector. Under current law, the work done under a CRADA must not detract from the mission responsibilities of a federal laboratory. The federal laboratory may accept funds, personnel, services, and property from the private sector partner and may provide personnel, services, and property in return, but the labs are expressly prohibited from providing direct funding to their collaborating partners.

Despite the success of the CRADA legislation, there are existing impediments to private companies entering into CRADAs. The law was originally designed to provide a great deal of flexibility in the negotiation of intellectual property rights to both the private sector partner and the federal laboratory; however, it provides little guidance to either party on the adequacy of those rights a private sector partner should receive in a CRADA.

Agencies are given broad discretion in the determination of intellectual property rights under CRADA legislation. This has often resulted in laborious negotiations of patent rights for certain laboratories and their partners each time they discuss a new CRADA. With options ranging from assigning the company full patent title to providing the company with only a nonexclusive license for a narrow field of use, both sides must undergo this negotiation on the range of intellectual property rights for each CRADA.

This uncertainty of intellectual property rights, coupled with the time and effort required in negotiation, may now be hindering collaboration by the private sector with federal laboratories. This, in essence, has become a barrier to technology transfer. Companies are reluctant to enter into CRADAs, or equally important, to com-

mit substantial investments to commercialize CRADA inventions, unless they have some assurance they will control important intellectual property rights.

H.R. 2196, the National Technology Transfer and Advancement Act of 1995, seeks to enhance the possibility of commercialization of technology and industrial innovation in the United States by providing assurances that sufficient rights to intellectual property will be granted to the private sector partner with a federal laboratory. The Act guarantees to the private sector partner the option, at minimum, of selecting an exclusive license in a field of use for a new invention created in a CRADA. The company would then have the right to use the new invention in exchange for reasonable compensation to the laboratory.

In addition, H.R. 2196 addresses concerns about government rights to an invention created in a CRADA. It provides that the Federal Government will retain minimum statutory rights to use the technology for its own purposes. It provides limited government "march-in-rights" if there is a public necessity that requires compulsory licensing of the technology. H.R. 2196 also provides enhanced financial incentives and rewards to federal laboratory scientists for new technology that results in marketable products, to be paid for from the income the laboratories receive for the commercialized technology.

Legislative history

Congresswoman Constance A. Morella of Maryland introduced H.R. 2196 on August 4, 1995. The bill was originally cosponsored by Congressmen Robert S. Walker of Pennsylvania, George E. Brown, Jr., of California, and John S. Tanner of Tennessee. Senator John D. Rockefeller, IV, of West Virginia introduced the Senate companion bill, S. 1164, on August 10, 1995.

On June 27, 1995, the House Science Committee's Technology and Basic Research Subcommittees held a joint hearing on technology transfer and our federal laboratories, with a focus on the draft text of H.R. 2196. The testimony from the June hearing supplemented the hearing record already established in the previous Congress on the bill text. On September 20, 1994, in the 103rd Congress, the House Science, Space, and Technology Committee's Technology, Environment, and Aviation Subcommittee held a hearing on H.R. 3590, the Technology Transfer Improvements Act of 1993, which led to further refinements in the bill.

On October 18, 1995, the Technology Subcommittee unanimously reported H.R. 2196 favorably to the Full Committee, with an amendment in the nature of a substitute. The amendment incorporated certain provisions affecting the National Institute of Standards and Technology (NIST), among others, which were approved by the House Science Committee, on June 28, 1995, as part of H.R. 1870, the American Technology Advancement Act of 1995. The amendment provisions were passed by the House on October 12, 1995, in Title VI of H.R. 2405, the Omnibus Civilian Science Authorization Act of 1995.

On October 25, 1995, the Science Committee considered H.R. 2196, as amended by the Subcommittee. The Committee accepted certain additional amendments to the bill and ordered H.R. 2196

reported to the House without objection by voice vote. On December 7, 1995, H.R. 2196 was reported to the House (amended) by the House Committee on Science Report Number 104-390. It was placed on Union Calendar Number 197 on December 7, 1995. On December 7, 1995, H.R. 2196 was called up by the House under suspension of the Rules and passed by voice vote. It was referred to the Senate Committee on Commerce, Science and Transportation on December 13, 1995. On February 7, 1996, the Senate Committee on Commerce, Science and Transportation discharged by Unanimous Consent and laid the measure before the Senate. S.1194 passed the Senate (amended) by voice vote on February 7, 1996. (Senate Report 104-194) On February 27, 1996, the motion that the House suspend the rules and agree to the Senate amendments, was agreed to by voice vote. On March 7, 1996, the President signed the bill which became P.L. 104-113.

1.2—P.L. 104-182, SAFE DRINKING WATER ACT AMENDMENTS OF 1996 (S. 1316/H.R. 3604) (SEE TITLE V OF H.R. 3322)

Background, summary, and legislative history

On June 10, 1996, Mr. Bliley introduced H.R. 3604, the Safe Drinking Water Act Amendments of 1996. On June 10, 1996, the bill was referred to the House Committee on Commerce. On June 11, 1996, the Commerce Committee marked-up the bill and ordered the measure reported (amended) by a vote of 42—0 (Report No. 104-632 (Part I)). On June 24, 1996, the bill was referred to the House Committee on Science sequentially, for a period ending not later than July 24, 1996. On June 25, 1996, the measure passed the House (amended) under suspension of rules by voice vote. The amendment included a new Title VI: Drinking Water Research Authorization, which included the drinking water related provisions of Title V of H.R. 3322. S. 1316, Safe Drinking Water Act Amendments of 1995, the Senate Companion to H.R. 3604, was taken-up in lieu of H.R. 3604.

On October 12, 1996, S. 1316 was introduced by Senator Kempthorne and referred to the Committee on Environment and Public Works. On October 24, 1995, the Committee ordered the measure reported (amended) (Report No. 104-169). On November 29, 1995, S. 1316 passed the Senate (amended) by Yea-Nay Vote: 99—0 (Record Vote No: 588). On July 17, 1996, the House struck all after the enacting clause and substituted the language of H.R. 3604; passed the measure by voice vote; insisted upon its amendment; requested conference; and the Speaker appointed conferees: from the Committee on Commerce for consideration of the Senate bill and the House amendment (except for Title V), and modifications committed to conference; as additional conferees from the Committee on Science (Walker, Rohrabacher, and Roemer), for the consideration of that portion of section 3 that adds a new section 1478 and sections 23, 25(f), and 28(f) of the Senate bill, and that portion of section 308 that adds a new section 1452(n) and section 402 and Title VI of the House amendment, and modifications committed to conference; and as additional conferees from the Committee on Transportation and Infrastructure, for the consideration of that portion of section 3 that adds a new section 1471(c) and sec-

tions 9, 17, 22(d), 25(a), 25(g), 28(a), 28(e), 28(h), and 28(i) of the Senate bill, and Title V of the House amendment and modifications committed to conference. On July 18, 1996, the Senate disagreed to the House amendment by unanimous consent; agreed to the request for conference; and appointed conferees. On August 1, 1996, Conference Report H. Rept. 104-741 was filed.

Title VI was modified and became Title II of the Conference Report. Title II, Drinking Water Research, authorizes $26,593,000 annually to be appropriated for drinking water research for FY 1997 through 2003; directs the Administrator to develop a strategic plan for drinking water research activities throughout EPA, integrate the plan into ongoing EPA planning activities, and review all EPA drinking water research to ensure the research is of high quality and does not duplicate any other research being conducted by EPA. A section added in conference from the Senate bill authorizes the Administrator of EPA to reestablish a partnership between the Robert S. Kerr Environmental Research Laboratory and the National Center for Ground Water Research to conduct research, training, and technology transfer for ground water quality protection and restoration.

On August 2, 1996, the House agreed to the Conference Report by yea-nay vote: 392—30 (Record Vote No: 399); the Senate agreed to the conference report by yea-nay vote: 98—0 (Record Vote No: 263); the measure was cleared for the White House and presented to the President. On August 6, 1996, the President signed the measure (P.L. 104-182).

1.3—P.L. 104-201, NATIONAL DEFENSE AUTHORIZATION ACT FOR FY 97 (H.R. 3230) (SEE SECTION 453 OF H.R. 3322 AND H.R. 3303)

Background and summary of legislation

The Committee participated in the House-Senate Conference on H.R. 3230, National Defense Authorization Act for Fiscal Year 1997. Messrs. Walker, Sensenbrenner, and Mrs. Harman were appointed conferees for Sections 203, Dual-Use Technology Programs; 211, Space Launch Modernization; 245, Amendments to Defense Experimental Program to Stimulate Competitive Research; and 247, National Oceanographic Partnership Act, of the House bill, and sections 211, Space Launch Modernization; 251-252, National Oceanographic Partnership Act; and 1044, Prohibition on Collection and Release of Detailed Satellite Imagery Relating to Israel and Other Countries and Areas, of the Senate amendment. All three Members signed the conference report.

The language of Section 247 of the House bill, National Oceanographic Partnership Act, was similar to Section 453 of H.R. 3322, Omnibus Civilian Science Authorization Act of 1996, as passed by the Committee on Science. Minor changes were made to reconcile the House and Senate versions of this provision.

Legislative history

H.R. 3230 was introduced on April 15, 1996, and passed by the House on May 15, 1996. The Senate passed S. 1745 on July 10, 1996, and requested a conference. The conference report cleared

the House on August 1, the Senate on September 10, and the President signed the legislation on September 23, 1996 (P.L. 104-201).

1.4—P.L. 104-227, ANTARCTIC SCIENCE, TOURISM, AND CONSERVATION ACT OF 1996 (H.R. 3060/S. 1645)

Background and summary of legislation

The 1991 Protocol on Environmental Protection to the Antarctic Treaty established specific principles and rules for protection of the Antarctic environment from human activities. Specifically, the Protocol addresses the protection of flora and fauna, imposes strict limits on the discharge of pollutants, and requires environmental impact assessments of planned governmental and non-governmental activities. The Protocol also forbids prospecting or development of Antarctic mineral resources, but excludes scientific research.

A particularly important aspect of the Protocol is its reinforcement of the status of Antarctica as a natural reserve devoted to peace and science. Antarctica is recognized as a unique scientific laboratory of enormous value to the international community. Preservation of the unique environment is intrinsic to its value for scientific purposes, and the Environmental Protocol is intended to help ensure that the pristine environment of the continent is preserved.

The Protocol was signed by the United States in October of 1991 and was approved by the Senate in October 1992. The United States must enact legislation in order to ratify the protocol. The protocol, however, is not self-executing. In order for the Protocol to be fully effective and enforceable, all 26 of the Antarctic Treaty Consultative Parties must ratify the Protocol. Of the 26 Antarctic Treaty Consultative Parties only 20 have ratified the Protocol, leaving the United States, Russia, Japan, India, Belgium, and Finland to complete action. H.R. 3060 provides the necessary legislative authority for the United States to implement the Protocol.

Legislative history

H.R. 3060 was introduced by Chairman Walker and 19 other original cosponsors on March 12, 1996. It was referred to the Committee on Science and to the Committees on International Relations, and Resources for those provisions under their jurisdiction. On April 18, 1996, the Full Committee held a hearing to review the bill. Witnesses included: Ms. Eileen Claussen, Assistant Secretary of State, Oceans and International Environmental and Scientific Affairs, U.S. Department of State; Dr. Neal Lane, Director, National Science Foundation; Ms. Kathryn S. Fuller, President, World Wildlife Fund; and Dr. Robert H. Rutford, Program of Geosciences, University of Texas at Dallas. All witnesses were supportive of legislation to implement the Protocol.

The Full Committee met to mark up the legislation on April 24, 1996. A quorum being present, H.R. 3060 was approved, without amendment, by voice vote, and ordered reported. The Committee filed House Report 104-593, Part 1, on May 23, 1996. Also on May 23, 1996, the Committees on International Relations and Resources discharged H.R. 3060 from further consideration.

A related measure was introduced in the Senate by Senator John Kerry (D-MA) on March 26, 1996 (S. 1645). It was referred to the Senate Committee on Commerce, Science and Transportation. No Senate hearings were held on the measure this Congress. Hearings were held in the previous Congress. The Full Committee met to mark up the legislation on June 6, 1996. S. 1645 was approved by the Committee and ordered reported, unamended. The Committee filed Senate Report 104-332 on July 24, 1996.

On June 10, 1996, H.R. 3060 was called up by the House under Suspension of the Rules and passed by a recorded vote of Yeas—352 to Nays—4. H.R. 3060 was received in the Senate on June 11, 1996. On September 4, 1996, the Senate called up H.R. 3060 and inserted the text of S. 1645 as amended. H.R. 3060, as amended, passed the Senate by unanimous consent. On September 10, 1996, H.R. 3060, as amended by the Senate, was called up by the House under Suspension of the Rules, and passed by voice vote. H.R. 3060 was presented to the President for signature on September 20, 1996. On October 2, 1996, the President signed H.R. 3060 into law (P.L. 104-227).

1.5—P.L. 104-264, FEDERAL AVIATION REAUTHORIZATION ACT OF 1996 (H.R. 3539) (SEE TITLE VII OF H.R. 3322 AND H.R. 3484)

Background, summary, and legislative history

On May 16, 1996, Chairwoman Morella introduced H.R. 3438, the Federal Aviation Administration—Research, Engineering, and Development Authorization and Management Reform Act of 1996. Its major provisions were subsequently incorporated into Title VII of H.R. 3322, the Omnibus Civilian Science Authorization Act of 1996.

The Full Committee met to mark up a Committee print for H.R. 3322 on April 24, 1996. After adopting five amendments, a quorum being present, the Full Committee approved the Committee print, as amended, by a recorded vote of yeas—24 to nays—19, and ordered it reported. A motion was then adopted to prepare a clean bill for introduction in the House, and that the measure be deemed reported by the Committee. The Committee filed House Report 104-550, Part 1, on May 1, 1996. On May 6, 1996, the Committees on Resources, Transportation and Infrastructure, and National Security discharged H.R. 3322 from further consideration.

On May 7, 1996, the Committee on Rules granted an open rule, adopting H. Res. 427. On May 9, 1996, the House passed the rule. H.R. 3322 was called up by the House under an open rule on May 29, 1996, with the Committee Amendment in the Nature of a Substitute considered as an original bill for the purpose of amendment. It was considered on May 29 and 30, 1996, and passed the House, with amendments, by voice vote, on May 30, 1996. H.R. 3322 was received in the Senate on June 3, 1996, and referred to the Senate Committee on Commerce, Science and Transportation. The Senate took no formal action on this legislation.

Title VII of H.R. 3322 (as passed by the House) was added to H.R. 3539 (Title VI/Title XI of the Conference Report), The Federal Aviation Authorization Act of 1996. Title XI of the Conference Report is the FAA Research, Engineering, and Development (RD&E)

Management Reform Act of 1996. Title XI authorizes $208 million for FAA research and development activities in Fiscal Year (FY) 1997—an increase of $21 million over the FY 1996 appropriated level. The language in Title XI was modified in Conference to increase the authorization for aviation security research by just over $21 million. This increase should allow the FAA to step-up its efforts to develop effective anti-terrorism technologies for U.S. airports. The title further directs the FAA research advisory committee to annually review the FAA research and development funding allocations and requires the Administrator of the FAA to consider the advisory committee's advice in establishing its annual funding priorities. Title XI streamlines the requirements of the National Aviation Research Plans and shortens the time-frame the plans must cover from 15 to 5 years.

On May 29, 1996, Mr. Shuster introduced H.R. 3539, the Federal Aviation Authorization Act of 1996. The bill was called up by House Under Suspension of Rules on September 10, 1996. An Amendment in the Nature of a Substitute was passed which included a new Title VI, the Federal Aviation Administration—Research, Engineering, and Development Authorization and Management Reform Act of 1996. Title VI is identical to Title VII of H.R. 3322 as passed by the House on May 30, 1996. The House passed H.R. 3539 (amended) by recorded vote 398—17 (Record Vote No: 411) on September 11, 1996. The bill was received in the Senate on September 12, 1996. On September 18, 1996, the measure was laid before the Senate by Unanimous Consent and the Senate struck all after the enacting clause and substituted the language of S. 1994 (amended). That day, the Senate passed H.R. 3539 in lieu of S. 1994 by yea-nay vote: 99—0 (Record Vote No. 293). The Senate then insisted upon its amendment and requested a conference. On September 19, 1996, the Senate appointed conferees.

On September 24, 1996, the House disagreed to the Senate amendment by Unanimous Consent; agreed to conference; and the Speaker appointed conferees from the Committee on Transportation and Infrastructure, for consideration of the House bill and the Senate amendment and modifications committed to conference; and the Speaker appointed additional conferees—from the Committee on Rules for consideration of section 675 of the Senate bill, and modifications committed to conference; from the Committee on Science (Walker, Morella, and Brown (CA)) for consideration of sections 601—05 of the House bill and section 103 of the Senate amendment, and modifications committed to conference; and for consideration of section 501 of the Senate amendment and modifications committed to conference (Walker, Sensenbrenner, and Brown (CA)); and from the Committee on Ways and Means for consideration of section 501 of the House bill and sections 417, 906, and 1001 of the Senate amendment and modifications committed to conference. On September 26, 1996, Conference report H. Rept. 104-848 was filed.

Title VI of H.R. 3539 became Title XI of the Conference Report with an amendment. On September 27, 1996, the House agreed to Conference Report by yea-nay vote: 218—198 (Record Vote No: 446). On October 1, 1996, the conference report was considered in Senate. On October 3, 1996 cloture on the Conference Report was

invoked by yea-nay vote: 66—31 (Record Vote No: 304); the Senate agreed to the Conference Report by yea-nay vote: 92—2 (Record Vote No: 306); and the bill was cleared for the White House. On October 9, 1996, the President signed the measure (P.L. 104-264).

1.6—P.L. 104-271, HYDROGEN FUTURE ACT OF 1996 (H.R. 655/H.R. 4138)

Background and summary of legislation

Hydrogen, as a gas or in liquid form, is an attractive source of energy because it combusts to water vapor and nitrogen oxide, leaving almost none of the pollutants associated with fossil fuels. There are several methods of producing hydrogen from water and other renewables, however, basic research is still needed to overcome many technical barriers. In a chemical reaction known as electrolysis, an enormous amount of energy is required to separate hydrogen from water molecules and to cool the gas enough to liquefy it. Equipment needed to store and burn liquid hydrogen is costly and heavy. At present, oil, natural gas and ethanol are less costly to produce. But recent technological breakthroughs, especially in the development of solar cells, may soon provide an inexpensive source of electricity to power electrolysis, which will make hydrogen cost competitive with fossil fuels.

In 1989, Congress passed the Renewable Energy and Energy Efficiency Technology Competitiveness Act of 1989, P.L. 101-218, to foster greater efficiency in the use of available energy supplies and greater use of renewable energy technologies. The Act directed the Secretary of Energy to: pursue cost competitive use of renewable energy technologies without the need of federal financial incentives; establish long-term federal research goals and multi-year funding goals; undertake initiatives to improve the ability of the private sector to commercialize in the near term renewable energy and energy efficiency technologies; and foster collaborative research and development efforts involving the private sector through government support of a program of joint ventures.

The Renewable Energy and Energy Efficiency Technology Competitiveness Act of 1989 authorized a number of energy research and development programs, including hydrogen. In fact, P.L. 101-218 required a separate, autonomous hydrogen program be established and delineated in the budget. Hydrogen activities, however, were loosely administered by the Department of Energy and hydrogen research and development was never given the priority and programmatic self-sufficiency which Congress intended.

A coordinated federal program for hydrogen research, development, and demonstration was established by passage of the Spark M. Matsunaga Hydrogen Research, Development, and Demonstration Program Act of 1990, P.L. 101-566. The Act set forth guidelines to carry out a federal program with the goal of resolving critical technical issues necessary for the development of hydrogen technologies. The funding authorization for the Act expired in FY 1994.

A supplemental legislative initiative for hydrogen research, development, and demonstration was included in Section 2026 of the Energy Policy Act of 1992, P.L. 102-486. The provisions reinforced the five-year program on renewable hydrogen energy contained in

P.L. 101-566 and required collaborative projects with industry to test and evaluate the production of hydrogen from a renewable energy source and to assess the feasibility of modifying existing natural gas pipelines to transport hydrogen and natural gas mixtures.

H.R. 655, the Hydrogen Future Act of 1995, continues to support a hydrogen research program by focusing the program on basic research and development. It establishes a coordinated basic research, development and demonstration program at DOE.

Legislative history

H.R. 655 was introduced by Chairman Walker on January 24, 1995, and referred solely to the Committee on Science. On February 1, 1995, the Full Committee held a hearing to review the bill. Witnesses included: the Honorable Christine A. Ervin, Assistant Secretary, Energy Efficiency and Renewable Energy, U.S. Department of Energy; Dr. Alan C. Lloyd, Chief Scientist, South Coast Air Quality Management District; Mr. Edward Trlica, President, Energy Partners, Inc.; and, Dr. Robert H. Williams, Senior Research Scientist, Center for Energy and Environmental Studies, Princeton University. Comments and criticisms were received on the bill.

The Full Committee met to mark up the legislation on February 10, 1995. Mr. Walker offered an Amendment in the Nature of a Substitute, which was adopted by unanimous consent. This amendment incorporated suggestions made by the witnesses at the hearing. After adopting eleven amendments to the Amendment in the Nature of a Substitute, a quorum being present, the Full Committee approved H.R. 655, as amended, by voice vote, and ordered the bill reported. The Committee filed House Report 104-95 on March 30, 1995.

On May 1, 1995, the Committee on Rules granted an open rule, adopting H. Res. 136. On May 2, 1995, the House passed the rule and passed the bill, with amendments, by voice vote. H.R. 655 was received in the Senate on May 3, 1995, and was referred to the Senate Committee on Energy and Natural Resources' Subcommittee on Energy Research and Development.

On March 20, 1996, the Subcommittee on Energy Research and Development held a hearing on the bill. The Full Committee marked up the bill on September 12, 1996 and ordered it reported, with an amendment, by voice vote (no subcommittee markup was held). On September 13, 1996, the Senate Committee on Energy and Natural Resources reported H.R. 655, with an Amendment in the Nature of a Substitute (no legislative report was filed by the Senate on this measure).

H.R. 4138, the Hydrogen Future Act of 1996, was introduced by Chairman Walker on September 24, 1996, and referred solely to the Committee on Science for consideration. H.R. 4138 incorporates some changes made to the earlier bill (H.R. 655) to accommodate interests of Members of the Senate. H.R. 4138 was called up under Suspension of the Rules on September 26, 1996 and passed by voice vote. The bill was received in the Senate on September 27, 1996, and on September 28, 1996 passed by unanimous consent. H.R. 4138 was presented to the President on September 30, 1996, for signature. On October 9, 1996, the President signed H.R. 4138 into law (P.L. 104-271).

1.7—P.L.104-289, SAVINGS IN CONSTRUCTION ACT OF 1996 (H.R. 2779)

Background and summary of legislation

The Metric Conversion Act of 1975 (P.L. 94-168), as amended by the 1988 Omnibus Trade Act (P.L. 100-418), was enacted in order to set forth the policy of the United States to convert to the metric system. Section 3 of that Act requires that each federal agency use the metric system of measurement in its procurements, grants and other business related activities, unless that use is likely to cause significant cost or loss of markets to United States firms, such as when foreign competitors are producing competing products in non-metric units.

Currently, many federal agencies are requiring as a condition of obtaining federal construction contracts that all bidders must agree to use products measured in round metric units. This standard is known as "hard-metric." This can require retooling, substantial capitalization costs, and other expensive production changes for some suppliers to physically change the size of the product.

This "hard-metric" conversion requirement has sometimes been imposed without appropriate regard to whether the method is impractical or likely to cause significant costs or a loss of markets to United States firms.

Some United States businesses that manufacture basic construction products suffer harm by being forced to convert to hard-metric production, or by being foreclosed from effectively bidding on federally financed projects.

Hard-metric conversion requirements may place domestic producers at a competitive disadvantage with respect to foreign producers; may reduce the number of companies that may compete for contracts with the Federal Government; and may force manufactures to maintain double inventories of similar but incompatible products. The hard-metric conversion requirement has also unnecessarily raised the cost to the Federal Government of some lighting and concrete masonry products and there is a consensus that relief is in order for these industries.

While the Metric Conversion Act of 1975 currently provides an exception to metric usage when impractical or when it will cause economic inefficiencies, there is a need for ombudsmen and procedures to ensure the effective implementation of this exception for afflicted industries. The changes made by this Act will advance the goals of the Metric Conversion Act of 1975 while eliminating significant problems in its implementation.

While estimates of savings vary, analysis of several projects indicates that hard metric conversion can cost 15-20% more to implement than "soft metric" conversion. Soft metric simply requires that building materials be measured in metric units instead of being manufactured in round metric dimensions.

Legislative history

H.R. 2779 was introduced by Congressman Cox on December 15, 1995, and referred to the Committee on Science. On May 16, 1996, the Subcommittee on Technology held a hearing entitled, "Proposed Amendments to the Metric Conversion Act," to review H.R. 2779, the Savings in Construction Act. The witnesses discussed the need

for flexibility in construction metrication by using "soft metric" versus "hard metric" measurements, especially where there are cases of adverse economic impact and barriers to competition. Witnesses testified regarding the need for the bill and their concerns with its implementation.

Presenting testimony at the hearing were: the Honorable Christopher Cox (R-CA); Mr. William Fabbri, Vice-President and General Manager of Lightolier; Mr. Rod Lee, Senior Vice President of Marketing at Lithonia Lighting; Mr. Norbert Rappl, President of Comac Building Supply; Mr. Donald Emich, President of Binkley & Ober; Mr. Randall Pence, Director of Government Relations for the National Concrete and Masonry Association (NCMA); Mr. Mark Bohannon, Counsel for Technology at the U.S. Department of Commerce; Mr. William Brenner, Director of the Construction Metrication Council; Mr. Tom Cunningham, Senior Project Manager at R.M. Schoemaker; Mr. David Wright, Vice President of United Masonry Inc. of Virginia; and Ms. Lorelle Young, President of the U.S. Metric Association. (See Committee Publication 104-50)

The Subcommittee convened to mark up H.R. 2779 on June 19, 1996. An Amendment in the Nature of a Substitute was offered as the markup vehicle, which was adopted by voice vote. The amendment provides specific relief for the concrete masonry and lighting industries in the interpretation of the Metric Conversion Act of 1975. In addition, it provides a mechanism, through the appointment of an ombudsman in each executive branch agency, for other afflicted industries to gain such relief in the future.

Subsequently in Subcommittee, an amendment to the Amendment in the Nature of a Substitute was offered, and adopted by voice vote, that clarified a definition in Section 3 of the bill with respect to hard versus soft metric. The Subcommittee passed H.R. 2779, as amended, by voice vote and ordered the bill reported, by voice vote, to the Full Committee for further consideration.

The Full Committee met to mark up H.R. 2779 on June 26, 1996. The only amendment offered was a manager's amendment by Technology Subcommittee Chairwoman Morella to make technical corrections. This amendment was adopted by voice vote. H.R. 2779, the Savings in Construction Act of 1996, was then passed, as amended, by voice vote, and ordered reported, by voice vote, to the Full House for consideration (House Report 104-639). On July 23, 1996, the House passed H.R. 2779 by voice vote. On July 24, 1996, the Senate received H.R. 2779 and referred it to the Commerce, Science, and Transportation Committee on July 29, 1996. It passed the Senate with an amendment on September 28, 1996. The House agreed to the Senate amendment under suspension of the rules on September 28, 1996, and presented it to the President on September 30, 1996. On October 11, 1996, the President signed H.R 2779 into law. (P.L. 104-289).

1.8—P.L. 104-332, NATIONAL INVASIVE SPECIES ACT OF 1996 (H.R. 4283/H.R. 3217)

Summary of the legislation and legislative history

On March 29, 1996, Mr. LaTourette introduced H.R. 3217, the National Invasive Species Act of 1996. The bill amends the Non-

indigenous Aquatic Nuisance Prevention and Control Act of 1990 to mandate: (1) regulations to prevent the introduction and spread of aquatic nuisance species into the Great Lakes through ballast water; and (2) voluntary guidelines to prevent such introduction and spread in U.S. waters by ballast water and other vessel operations. The bill authorizes mandatory regulations if guideline compliance is inadequate; provides for enforcement through revocation of clearance and civil and criminal penalties; encourages negotiations with foreign governments to develop and implement an international program for preventing such introduction and spread in North American waters; and mandates studies of Lake Champlain, the Chesapeake Bay, San Francisco Bay, Honolulu Harbor, Prince William Sound, and other waters.

H.R. 3217 also requires annual grants for six years for aquatic nuisance species prevention and control research in the Chesapeake Bay and the Gulf of Mexico. It establishes a clearinghouse of national data on ballasting practices and compliance with guidelines under the bill, and mandates a ballast water management program for the Navy's seagoing fleet to limit the risk of invasion by nonindigenous species from ballast water. The bill further requires: (1) a ballast water management program to demonstrate technologies and practices to prevent aquatic nonindigenous species from being introduced into and spread through ballast water in U.S. waters; and (2) that the installation and construction of those technologies and practices be performed in a U.S. shipyard or ship repair facility. It also modifies: (1) the composition and research priorities of the Aquatic Nuisance Species Task Force; and (2) zebra mussel demonstration program requirements. The measure requires the Task Force to encourage (including through financial assistance) the development and use of regional coordination panels and similar entities in regions other than the Great Lakes; provides for interstate (in addition to existing State) aquatic nuisance species management plans, allowing Indian tribes as well as States to participate; and authorizes appropriations.

The bill was referred to the Committee on Transportation and Infrastructure, and to the Committee on Resources. On September 12, 1996, the Transportation Committee ordered the bill reported (amended) by voice vote (Report No: 104-815 (Part I)). On September 20, 1996, the measure was sequentially referred to the Committee on Science. The Committee on Transportation agreed to changes recommended by the Committee on Science to ensure that: (1) authorization contained within the bill were consistent with authorizations passed by the House in H.R. 3322; (2) the measure did not earmark funds within the jurisdiction of the Science Committee to specific research institutions; and (3) all research funding authorized by the measure within the jurisdiction of the Science Committee is peer reviewed. On September 24, 1996, the Committee on Resources and the Committee on Science were discharged from further consideration of the bill; the measures was called up by the House under Suspension of Rules; and passed the House (amended—including Science Committee recommended changes) by voice vote. On September 25, 1996, the bill was received in the Senate and referred to Senate Committee on Environment and Public Works.

On September 28, 1996, Mr. LaTourette introduced H.R. 4283, the National Invasive Species Act of 1996. H.R. 4283 is the text of H.R. 3217 amended to take into account changes requested by the Senate. On September 28, 1996, H.R. 4283 was called up by the House by Unanimous Consent and passed the House by voice vote. On September 30, 1996, the bill was received in the Senate. On October 3, 1996, the Senate passed the bill by Unanimous Consent, and it was cleared for the White House. The President signed H.R. 4283 on October 26, 1996 (P.L. 104-332).

CHAPTER II—OTHER LEGISLATIVE ACTIVITIES OF THE COMMITTEE ON SCIENCE

2.1—RISK ASSESSMENT AND COST-BENEFIT ACT OF 1995 (H.R. 9/H.R. 1022)

Background and summary of legislation

The Risk Assessment and Cost/Benefit Analysis legislation was drafted in response to the need to develop clear and consistent guidelines on the conduct of risk assessment and cost benefit analysis for programs throughout the Federal Government which regulate and otherwise manage risks to human health, safety and the environment. The legislation seeks to ensure that these assessments and analyses are formulated using the best science available.

The cost of regulation runs in the hundreds of billions of dollars. Federal regulatory costs are too often out of proportion to the problems that the regulations are designed to address, requiring expenditures of substantial economic resources on reductions in risk which are hypothetical.

Federal risk assessment, characterization and communication has often been biased and based on a series of hypothetical assumptions which are designed to overstate the risks. In many contexts, federal agencies explicitly state that their risk assessment process is designed to produce estimates that "err on the side of safety" because of scientific uncertainties, and to ensure that the broadest range of the public is covered. It is generally believed that the "upper bound estimates" are highly improbable and differ from the most plausible level of risk by many orders of magnitude. Moreover, the practice of only calculating upper bound or worst case estimates of risk inappropriately collapses scientific findings with a preconceived policy judgment or bias. The perceived overstatement of risk is a serious concern among the regulated community. Many argue there should be "best estimates" or estimates of expected value in addition to upper-bound estimates to provide a more realistic benchmark.

Some federal provisions require consideration of the costs and benefits of regulatory alternatives, although the specific language authorizing such consideration differs greatly among statutes. While these resulting regulatory decisions are judicially reviewable, the general standards of review is for courts to be deferential to federal agencies concerning the analysis of factual issues. Moreover, many federal statutes prohibit, or do not explicitly authorize, consideration of costs and benefits for determining regulatory requirements.

The Reagan Administration issued Executive Order 12291 in order to encourage agencies to at least try to assess the costs and benefits of regulatory options where statutes did not otherwise

compel such an assessment. As an executive order, the assessments were not judicially reviewable. The Clinton Administration has replaced Executive Order 12291 with Executive Order 12866 which, more or less, continues the requirements of 12291.

Many advocate giving more prominence to the consideration of the relationship between costs and benefits and setting regulatory priorities to both save money and increase protection by focusing resources on the greatest risk reduction opportunities. Major purposes of the bill include:

1. To present the public and executive branch with the most scientifically objective and unbiased information concerning the nature and magnitude of health, safety, and environmental risks in order to provide for sound regulatory decisions and to educate federal, state and local decision makers and the public.

2. To provide for full consideration and relevant data and potential methodologies used to assess, communicate and characterize health, safety, and environmental risk.

3. To require an explanation of significant choices in the risk assessment process which will allow for better peer review and public understanding.

4. To improve consistency within the executive branch in preparing risk assessments and risk characterizations through, among other methods, further research in the risk assessment methodology.

5. To undertake for every major rule designed to protect health, safety and the environment an analysis of the costs and benefits of that regulatory action.

6. To establish a certification process by the head of each agency promulgating rules designed to protect health, safety and the environment that such regulations are based on objective and unbiased scientific and economic evaluation, and that the incremental risk reduction or other benefits will be likely to justify, and be reasonably related to, the incremental costs incurred by state, local, tribal governments, and the Federal Government and other public and private entities.

7. To establish a certification process that no regulatory or nonregulatory alternative considered by the agency, or proposed to the agency, would be more likely to achieve a substantially equivalent reduction in risk in a more cost-effective manner.

8. To establish an independent and external peer review program of risk assessments used to formulate those regulations.

9. To clarify that judicial review of this legislation shall be pursuant to the Administrative Procedure Act.

To establish that for any risk assessment, risk characterization, cost benefit analysis, or peer review program, prepared by, or on behalf of, any federal agency, that the head of each agency shall prioritize threats to human health, safety and the environment according to the seriousness of the risk and to achieve the greatest reduction in risk, given the resources available to address those risks.

Legislative history

In the 103rd Congress, Chairman Walker was an original cosponsor of H.R. 2910, the Risk Communication Act of 1993, introduced

by Representative Carlos Moorhead (R-CA) on August 6, 1993. In the 104th Congress, H.R. 2910 became Title III—Risk Assessment and Cost Benefit Analysis for New Regulations introduced as part of H.R. 9, the "Job Creation and Wage Enhancement Act of 1995" by Representatives Bill Archer (R-TX), Tom Delay (R-TX), Jim Saxton (R-NJ), Linda Smith (R-WA) and Billy Tauzin (R-LA), on January 4, 1995. Title III of H.R. 9 was referred to the Committee on Science, and to the Committees on Commerce and Government Reform and Oversight for those provisions under their jurisdiction. H.R. 9 was also referred to the Committees on Budget, Judiciary, Rules, Small Business, and Ways and Means for other titles and sections under their jurisdiction.

On January 31, 1995, the Full Committee held the first of two hearings on Title III of H.R. 9. The first hearing focused on the views of the private sector and witnesses included: Dr. Jerry J. Jasinowski, President, National Association of Manufacturers (NAM), representing the Alliance for Reasonable Regulation; Dr. John Graham, Professor of Policy and Decision Sciences, Harvard Center for Risk Analysis; Mr. Gordon Garner, Executive Director, Louisville and Jefferson County Metropolitan Sewer District; Mr. Sam Kazman, General Counsel, Competitive Enterprise Institute; and Mr. Scott Holman, President/CEO, Bay Cast, Inc. Witnesses were supportive of the bill.

On February 3, 1995, the Full Committee held the second hearing on Title III of H.R. 9. Testimony was received from Members of Congress, the Administration, and academia, regulatory and other public policy institutes and included: Congressman John Mica (R-FL); Congressman Dick Zimmer (R-NJ); the Honorable Jack Gibbons, Director, Office of Science and Technology Policy (OSTP), the White House; Dr. Lynn Goldman, Assistant Administrator, Office of Prevention, Pesticides, and Toxic Substances, U.S. Environmental Protection Agency (EPA); Mr. Keith Collins, Acting Chief Economist, Department of Agriculture; Mr. William Schultz, Deputy Commissioner for Policy, Food and Drug Administration; Dr. Thomas A. Burke, Associate Professor of Health Policy and Management, John Hopkins University School of Hygiene and Public Health; Dr. Paul R. Portney, Vice President, Resources for the Future; Mr. Thomas O. McGarity, University of Texas School of Law; Mr. Terry F. Yosie, Senior Vice President, E. Bruce Harrison Company; The Honorable Don Ritter, former Representative from the 15th district, Pennsylvania, Chairman, National Environmental Policy Institute; and Mr. Thorne Auchter, former Assistant Secretary of Labor, Occupational Safety and Health Administration. EPA Assistant Administrator Dr. Lynn Goldman testified that the Administration believes the bill would create delays and make government less efficient.

The Full Committee met to mark up Title III of H.R. 9 on February 8, 1995. Chairman Walker offered an Amendment in the Nature of a Substitute, which was adopted. The amendment incorporated suggestions made by witnesses at the hearings. After adopting twelve amendments to the Amendment in the Nature of a Substitute, a quorum being present, the Full Committee approved Title III of H.R. 9, as amended, by voice vote, and ordered the bill reported. The Committee filed House Report 104-33 (Part

II) on February 15, 1995. House Report 104-33 (Part I) was filed by the Commerce Committee, also on February 15, 1995.

H.R. 1022, the Risk Assessment and Cost Benefit Act of 1995, was introduced by Chairman Walker on February 23, 1995. It was a compromise bill introduced following the filing of House reports by the Science and Commerce Committees. H.R. 1022 was referred to the Committee on Science, and to the Committees on Commerce and Government Reform and Oversight for those provisions under their jurisdiction. On February 24, 1995, the Rules Committee granted, by a recorded vote, Yeas—9, Nays—3, a modified open rule providing for two hours of debate and a ten hour time limit on amendments by adopting H. Res. 96 and reported it to the House. On February 27, 1995, the Committee on Rules discharged Committees of jurisdiction from further consideration of H.R. 1022.

H.R. 1022 was called up by the House on February 27, 1996, and the House passed the rule. General debate and amendments were considered on February 27 and 28, 1995. On February 28, 1995, the House agreed to amendments adopted by the Committee of the Whole and defeated a motion to recommit, with instructions, by a recorded vote, Yeas—174, Nays—250. The House then passed H.R. 1022, amended, by a recorded vote, Yeas—286, Nays—141. Pursuant to the provisions of H. Res. 101, the House incorporated the text of this measure, as passed by the House, into H.R. 9.

H.R. 9 was called up by the House by rule on March 3, 1995. At that time, the House struck all after Section 1 and inserted in lieu thereof the provisions of a text composed of 4 divisions: (1) H.R. 830; (2) H.R. 925; (3) H.R. 926; and (4) H.R. 1022, as each bill was passed by the House. A motion to recommit with instructions was defeated by a recorded vote, Yeas—180, Nays—239. The House passed H.R. 9, as amended, on March 3, 1995 by a recorded vote, Yeas—277, Nays—141. H.R. 9 was received in the Senate on March 9, 1995, and referred to the Senate Committee on Governmental Affairs. The Senate took no formal action on H.R. 9.

Provisions of H.R. 9 and H.R. 1022 were incorporated into H.R. 2586, to provide for a temporary increase in the public debt limit. H.R. 2586 was introduced by Representative Bill Archer on November 7, 1995, and referred to the Ways and Means Committee. The Ways and Means Committee held a markup on November 7, 1995, and ordered the bill reported, as amended. House Report 104-325 was filed by the Ways and Means Committee on November 7, 1995. On November 9, 1995, the House passed H. Res. 258, the rule under which H.R. 2586 was considered by a recorded vote, Yeas—220, Nays—200, and passed the bill, H.R. 2586, by a recorded vote, Yeas—227, Nays—194. Also on November 9, 1995, the Senate passed H.R. 2586, as amended, by a recorded vote, Yeas—49, Nays—47. On November 10, 1995, the House agreed to the Senate amendment, clearing the measure for the President by a recorded vote, Yeas—219, Nays—185. The President vetoed H.R. 2586 on November 10, 1995.

2.2—NATIONAL SEA GRANT COLLEGE PROGRAM (H.R. 1175)

Background and summary of legislation

The National Sea Grant College Program Act was passed in 1966 to increase understanding of marine resources in order to improve their management, utilization and conservation. In 1970, Sea Grant was transferred from the National Science Foundation (NSF) to the newly-created National Oceanic and Atmospheric Administration (NOAA). The National Sea Grant College Program, one of two extramural ocean research programs within OAR, accounts for roughly 20 percent of OAR's annual expenditure. Authorization for the National Sea Grant College Program expired at the end of Fiscal Year (FY) 1995.

The Committee amended H.R. 1175, the Marine Resources Revitalization Act of 1995, to make it consistent with the provisions of H.R. 1815, the National Oceanic and Atmospheric Act Authorization of 1995. H.R. 1815 was incorporated into H.R. 2405, the Omnibus Civilian Science Authorization Act of 1995.

H.R. 1175, as amended by the Science Committee, amended Public Law 89-454 to provide for the reauthorization of the National Sea Grant College Program Act (33 U.S.C. 1121 et seq.) for FY 1996, terminated low-priority elements of the program, and made certain improvements to refocus the program on scientific research.

The core Sea Grant Program was funded at $49 million in FY 1995. Of that total, $2.9 million was used for administration of the national program. An additional $1.5 million was appropriated for oyster disease research and $2.8 million for zebra mussel research, which is authorized under a separate statute. The Administration requested $49.4 million for the Sea Grant Program for FY 1996 and recommended no funding for the Sea Grant zebra mussel and oyster disease programs.

Through amendments to H.R. 1175, the Committee refocused the Sea Grant program exclusively on scientific research and authorized $34.5 million for this purpose along with an additional $1.5 million for administration of the national program for FY 1996. H.R. 1175, as passed by the Science Committee, eliminated the Dean John Knauss Marine Policy Fellowship Program and the Sea Grant International Program. The bill refocused the Sea Grant program on scientific research by refocusing the definition of "fields related to ocean, coastal, and Great Lakes resources on science." The bill also banned the use of federal Sea Grant funds for lobbying activities, and restricted future funding for institutions which receive appropriations earmarks.

Legislative history

On February 21, 1995, the Subcommittee held a hearing on NOAA's FY 1996 budget. Testifying on NOAA's budget before the Subcommittee was Dr. James Baker, Under Secretary for Oceans and Atmosphere, Department of Commerce, and Administrator of NOAA. Dr. Baker indicated the Administration's support for funding Sea Grant at $49 million for FY 1996.

Mr. Young introduced H.R. 1175 on March 8, 1995. It was referred to the Committee on Resources and reported, as amended, on May 16, 1995. H.R. 1175 was then referred to the Committee

on Science on May 17, 1995. The full Science Committee held a markup of H.R. 1175 on June 28, 1995, and adopted an Amendment in the Nature of a Substitute offered by Mr. Walker to incorporate the Sea Grant-related provisions of H.R. 1815, the National Oceanic and Atmospheric Administration Authorization Act of 1995, into H.R. 1175. The substitute authorized appropriations of $36 million for FY 1996 for the National Sea Grant College Program. H.R. 1175, as amended, was ordered reported by voice vote to the full House for consideration. On July 11, 1995 the measure was reported to the House and placed on the Union Calendar.

The provisions of H.R. 1175, as amended by the Committee on Science, were incorporated into Title IV of H.R. 2405, the Omnibus Civilian Science Authorization Act of 1995. H.R. 2405 passed the House on October 12, 1995. Prior to passage, the House adopted a Weldon (PA) amendment which increased the authorization level for the Sea Grant Program in H.R. 2405 from $36 million to $53 million for FY 1996. No other changes were made to the Sea Grant provisions of H.R. 2405. The Senate took no action on H.R. 2405 during the 104th Congress.

Committee Publication Number 104-10 and H. Rept. 104-123 (Part II).

2.3—INTERNATIONAL SPACE STATION AUTHORIZATION ACT OF 1995 (H.R. 1601)

Background and summary of legislation

H.R. 1601 gives the National Aeronautics and Space Administration (NASA) the authority to proceed on its current, baseline International Space Station development plan, extending from Fiscal Year 1996 through assembly complete in Fiscal Year 2002. It authorizes a total of $13,141,000,000 not to exceed $2,121,000,000 in any one fiscal year. The authorization is conditioned upon each year's success, meaning NASA must stay on budget and on time for the legislation to remain effective.

The Space Station program has been redesigned a number of times since its inception in 1984 as the Space Station Freedom program, and was first funded in the Fiscal Year 1985 budget cycle. In early 1993, President Clinton ordered NASA to redesign the Freedom program again, ultimately resulting in the Alpha design announced in September of that year. The cost of the Space Station has increased from $8 billion, as proposed in 1984, to $30 billion prior to the final redesign. Most of that nearly 4 to 1 cost growth can be attributed to redesigns and fiscal stretch-outs called for by actions taken by the Congress.

The 1993 redesign was aimed at cost reduction while at the same time limiting the annual total to $2.1 billion. This along with a total authorization of $13,141,000,000 is a significant savings over earlier designs and projections. The redesigned Space Station will offer more laboratory space and more power than any of the previous designs. The President has spared the Space Station from NASA's significant budget cuts and touted it as the highest national priority in space today.

Legislative history

H.R. 1601 was introduced on May 10, 1995, by Chairman Robert S. Walker and Subcommittee on Space and Aeronautics Chairman F. James Sensenbrenner, Jr. It was referred solely to the Committee on Science and its Subcommittee on Space and Aeronautics.

The Subcommittee on Space and Aeronautics held a hearing on the overall budget of NASA on February 13, 1995, reviewing testimony from NASA Administrator Daniel S. Goldin. On March 16, 1995, the Subcommittee held another hearing that examined, in detail, NASA program budgets with testimony from non-agency witnesses including a Space Station panel. Witnesses on that panel included: Mr. Richard H. Kohrs, Director, Center for International Aerospace Cooperation; Mr. Norman R. Parmet, Chairman of the Aerospace Safety Advisory Panel; Dr. Hans Mark, Professor of Aerospace Engineering and Engineering Mechanics at the University of Texas at Austin; Dr. Maxime A. Faget, founder of Space Industries, Inc.; and Ms. Lori Garver, Executive Director of the National Space Society. During these hearings, witnesses expressed strong support for the Space Station program. In addition, the Subcommittee sponsored a NASA program review of the Space Station on February 16, 1995, for the benefit of Subcommittee Members and their staffs.

On June 7, 1995, the Subcommittee on Space and Aeronautics completed its consideration of H.R. 1601, as amended, and reported it to the Full Committee for consideration. On June 28, 1995, the Full Committee approved H.R. 1601, as amended, by the Yeas and Nays: 34—8, and it was reported to the House (H. Rept. 104-210). On September 21, 1995, the Rules Committee adopted H. Res. 228, an open rule, and reported H.R. 1601 to the House. On September 27, 1995, the Rule passed the House. A Committee Amendment in the Nature of a Substitute was considered as an original bill for the purpose of amendment. On September 28, 1995 the House agreed to amendments adopted by the Committee of the Whole and H.R. 1601 passed the House, as amended, by voice vote. On October 10, 1995, H.R. 1601 was received in the Senate and referred to the Senate Committee on Commerce, Science and Transportation. The Senate took no formal action on this legislation, however the Space Station was authorized at the budget request level in Fiscal Year 1996 by S. 1048, the National Aeronautics and Space Administration Authorization Act for Fiscal Year 1996.

2.4—DEPARTMENT OF COMMERCE DISMANTLING ACT (H.R. 1756)

Background and summary of legislation

The Department of Commerce was established on March 4, 1913. Prior to its creation, the government's commerce and labor activities were performed by the Department of Commerce and Labor, which was established by Congress on February 14, 1903. The Department of Commerce has five basic missions: to promote the development of American business and increase foreign trade; to improve the nation's technological competitiveness; to foster environmental stewardship and assessment; to encourage economic development; and to compile, analyze and disseminate statistical information on the U.S. economy.

The policy debate over the elimination of the Department of Commerce focuses mainly on the Department's role in community development, economic analysis, management of important statistical programs, international trade policy, oceanic and atmospheric matters, technology promotion, and telecommunications policy. Those in Congress in favor of abolishing the Department argue that it is an unmanageable conglomeration of marginally related programs, most of which duplicate those performed in other federal agencies. H. Con. Res. 67, which served as a blueprint for fiscal spending through the year 2002, passed both Houses of Congress on June 29, 1995, and expressed the sense of Congress that the Department of Commerce should be eliminated.

H.R. 1756 would establish a Commerce Programs Resolution Office for a period of three years from the date of enactment of the bill to deal with the disposition of those functions currently housed in the Department of Commerce. It provides a detailed plan to dismantle the Department, calling for the termination, consolidation, privatization and streamlining of programs within the Department. Specifically, H.R. 1756 would terminate the Technology Administration, including the Advanced Technology Program (ATP) and the Manufacturing Extension Partnership (MEP); transfer the weights and measures functions of the National Institute of Standards and Technology (NIST) to the National Science Foundation (NSF), and would sell NIST laboratories to the private sector; privatize the National Technical Information Service (NTIS); transfer many of the functions of the National Oceanic and Atmospheric Administration (NOAA) to several different agencies and departments; terminate state fisheries grants and commercial fisheries promotion programs, coastal and water pollution research activities, the Office of Oceanic and Atmospheric Research (OAR); and privatize certain other NOAA functions.

Legislative history

H.R. 1756 was introduced by Congressman Dick Chrysler (R-MI) on June 15, 1995. The Committee on Commerce had primary jurisdiction over H.R. 1756. In addition, sequential referral was given to the Committees on Science, Transportation and Infrastructure, Banking and Financial Services, International Relations, National Security, Agriculture, Ways and Means, Government Reform and Oversight, the Judiciary, and Resources. The Science Committee considered only those portions of H.R. 1756 under its jurisdiction. House-related legislation includes H.R. 2491, the Seven-Year Balanced Budget Reconciliation Act of 1995, introduced by Representative John R. Kasich (R-OH) on October 17, 1995.

On June 28, 1995, the Full Committee held the first in a series of hearings on restructuring the federal scientific establishment. This first hearing focused on the creation of a Department of Science to house the science elements of the Federal Government. The proposal combined the science programs of the existing Commerce and Energy Departments, along with the National Aeronautics and Space Administration, the National Science Foundation, the Environmental Protection Agency, and the United States Geological Survey. Witnesses included: the Honorable George A. Keyworth, former Reagan science advisor and Chairman, The

Progress and Freedom Foundation; the Honorable Don Ritter, former Representative, 15th district in Pennsylvania and Chairman, National Environmental Policy Forum; the Honorable Henson Moore, former Representative from Louisiana and former Deputy Secretary of Energy under President Bush and President and CEO, The American Forest and Paper Association; and Dr. Joseph Spigai, Director, Engineering Management Program, the University of Maryland. All witnesses were supportive of housing federal science programs under one roof.

On September 12, 1995, the Full Committee held the second hearing on restructuring the federal scientific establishment, specifically to review H.R. 1756. Witnesses included: the Honorable Ronald H. Brown, Secretary, Department of Commerce; the Honorable Barbara Hackman Franklin, former Secretary of Commerce and President and CEO, Barbara Franklin Enterprises; Representative Dick Chrysler; Admiral James D. Watkins, former Secretary of Energy and President, Consortium for Oceanographic Research and Education; Mr. Paul Wolff, former Assistant Administrator for Ocean Services, NOAA; Dr. John Knauss, former Administrator of NOAA and Professor and Dean Emeritus, Graduate School of Oceanography, University of Rhode Island; Dr. Richard Hallgren, Executive Director, American Meteorological Society; Mr. Mike Smith, President, WeatherData, Inc.; Mr. Anthony R. O'Neill, Vice President, Government Affairs, National Fire Protection Association; Mr. John F. Walrad, Director of Licensing and Patents, Vickers, Inc.; Dr. Robert Jay Hermann, Senior Vice President, Science and Technology, United Technologies; Dr. Harold K. Forsen, Vice President, Director, Bechtel Hanford, Inc.; Mr. Samuel D. Cheatham, Vice President, Corporate Strategic Initiatives, Storage Technology Corporation; Mrs. Jean G. Mayhew, Chairman, NTIS Advisory Board, Director of Information Services, United Technologies Research Center; and, Mr. Daniel C. Duncan, Vice President, Government Relations, Information Industry Association. Secretary Brown was of the opinion that the various programs within the Department were synergistic and not in need of elimination, privatization or movement to other agencies; that Administration downsizing and streamlining efforts were adequate to address any inefficiencies. Most of the other witnesses expressed the opinion that the intramural programs within NIST should be kept together, as should the programs within NOAA.

The Full Committee met to mark up the legislation on September 14, 1995. Mr. Walker offered an Amendment in the Nature of a Substitute, which was adopted by unanimous consent. The substitute would place the science functions of the Department of Commerce under the jurisdiction of the Committee in a sub-cabinet level Administration. After adopting seven amendments to the Amendment in the Nature of a Substitute, a quorum being present, the Full Committee approved H.R. 1756, as amended, by voice vote, and ordered the bill reported. No formal report was filed on this bill. However, the markup proceedings can be found in Science Committee publication No. 40.

A related measure was introduced in the Senate by Senator Spencer Abraham (R-MI) on June 15, 1995 (S. 929). It was referred to the Senate Committee on Governmental Affairs. The Full Com-

mittee held hearings on the bill on July 25, and July 27, 1995. The Full Committee met to mark up the legislation on September 7, 1995. S. 929 was approved by the Committee and ordered reported, amended. The Committee filed Senate Report 104-164 on October 20, 1995. No further action was taken by the Senate.

Of the above-mentioned House Committees with jurisdiction over H.R. 1756, only the Ways and Means Committee filed a report with the House—House Report 104-260, (Part 1). No formal action was taken by the House on H.R. 1756. However, H.R. 1756 was passed as Title XVII of H.R. 2491, the Seven-Year Balanced Budget Reconciliation Act of 1995, on October 26, 1995.

2.5—ENVIRONMENTAL RESEARCH, DEVELOPMENT, AND DEMONSTRATION AUTHORIZATION ACT OF 1995 (H.R. 1814)

Background and summary of legislation

The Subcommittee on Energy and Environment holds jurisdiction over the Office of Research and Development (ORD), which is responsible for the environmental research, development, and demonstration programs of the Environmental Protection Agency (EPA). Programs of the ORD have not been authorized since enactment of the Environmental Research, Development and Demonstration Act of 1981 (P.L. 96-569), which expired on September 30, 1981.

The bill, the Environmental Research, Development, and Demonstration Authorization Act of 1995, met the Committee's responsibility to set priorities and reflects a strong commitment to both good fundamental science and a balanced budget. H.R. 1814 authorized all ORD programs within the limits established in the Concurrent Resolution on the Budget for Fiscal Year 1995 (H. Con. Res. 67), refocused ORD resources on its core missions, and improved the oversight of science within the Agency.

The Administration requested $629.4 million for EPA's ORD for FY 1996, an increase of $83.8 million, or 15.4 percent, over the FY 1995 estimate of $545.5 million. H.R. 1814 authorized appropriations in the amount of $490 million for FY 1996, a decrease of $139.4 million, or 22.1 percent, from the requested level, and a decrease of $55.5 million, or 10.2 percent, from the FY 1995 estimate.

Legislative history

On February 13, 1995, the Subcommittee held a hearing to receive testimony on ways to reduce spending in the research and development programs of the three agencies under its jurisdiction, including the EPA. Additional testimony was taken on EPA's FY 1996 budget request for ORD in a hearing held by the Subcommittee on February 16, 1995. Dr. Robert J. Huggett, Assistant Administrator for the ORD at EPA, and Dr. Roger O. McClellan, President of the Chemicals Industries Institute of Toxicology and Member of the Executive Committee of the Science Advisory Board, presented testimony.

Mr. Rohrabacher, Chairman of the Subcommittee on Energy and Environment, introduced H.R. 1814 on June 13, 1995, and the bill was referred solely to the Committee on Science. The Subcommittee on Energy and Environment met to markup a Subcommittee

print of the legislation on June 8, 1995. No amendments to the measure were offered, and the Subcommittee adopted the Subcommittee print of H.R. 1814 by voice vote and ordered it to be reported to the Full Committee for further consideration. The Full Committee met on June 21, 1995 to consider H.R. 1814. The Committee adopted two amendments: (1) Mr. Walker's en bloc amendment for clarification; and (2) Mr. Boehlert's en bloc amendment to restore funding to the EPA graduate fellowship program. H.R. 1814, as amended, was ordered to be reported to the House by a voice vote. Combined with six other authorization bills reported out of the Committee on Science into an omnibus authorization, H.R. 1814 became Title V of H.R. 2405, the Omnibus Civilian Science Authorization Act of 1995. Mr. Walker introduced H.R. 2405 on September 27, 1995, and the House of Representatives passed the bill on October 12, 1995 by a vote of 248 to 161. The Senate received H.R. 2405 on October 17, 1995 and referred the measure to the Committee on Commerce.

Committee Publication Number 104-10 and H. Rept. 104-199.

2.6—NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION AUTHORIZATION ACT OF 1995 (H.R. 1815)

Background and summary of legislation

The National Oceanic and Atmospheric Administration (NOAA), created in 1970 by Executive Order of President Nixon, has obtained most of the funding for its programs over the last twenty years through direct appropriation without annual legislative authorization. During the 102nd Congress, the first comprehensive NOAA authorization bill was approved and signed into law, the National Oceanic and Atmospheric Administration Authorization Act of 1992 (Public Law 102-567). With three exceptions, P.L. 102-567 only authorized funding for Fiscal Years (FY) 1992 and 1993. The exceptions were the Next Generation Weather Radar (NEXRAD) program and the Geostationary Operational Environmental Satellite (GOES) program (authorized through completion), and the NOAA Fleet Modernization (authorized through FY 1997). No comprehensive NOAA authorization bills have been signed into law since the 102nd Congress.

NOAA programs under the jurisdiction of the Committee on Science include: all of the National Weather Service (NWS); the Office of Oceanic and Atmospheric Research (OAR); and the National Environmental Satellite, Data, and Information Services (NESDIS), and portions of the National Ocean Service (NOS). H.R. 1815, the National Oceanic and Atmospheric Administration Authorization Act of 1995, met the Committee's responsibility to authorize programs under its jurisdiction, set priorities within NOAA and streamline NOAA operations while staying within the budget resolution targets for NOAA required to balance the budget by the year 2002.

The Administration's budget request for FY 1996 included a request of $2,201,531,000 for NOAA, an increase of $179,779,000, or 8.9 percent, over the FY1995 estimate of $2,021,752,000. The Committee recommended an authorization level of $1,725,201,000 for FY 1996, a decrease of $476,330,000, or 21.6 percent, from the

President's request, and a decrease of $296,551,000, or 14.7 percent, from the FY 1995 estimate. The Committee's recommendation was consistent with the amounts established in the House-passed Concurrent Resolution on the Budget for FY 1995 (H. Con. Res. 67) and reflected a strong commitment to good fundamental science that is vital to the nation's future.

Legislative history

The Subcommittee held a hearing on February 13, 1995, to receive testimony on ways to reduce spending in the research and development programs of the three agencies under its jurisdiction, including NOAA. In addition, NOAA's FY 1996 budget request for programs under the jurisdiction of the Subcommittee on Energy and Environment was addressed in a Subcommittee hearing held on February 21, 1996. Dr. D. James Baker, Under Secretary for Oceans and Atmosphere, and Administrator of NOAA, U.S. Department of Commerce; Mr. Joel Myers, President of Accu-Weather, Inc.; and Mr. Joel Willemssen, Director of Accounting and Information Management Division of the U.S. General Accounting Office, presented testimony.

Mr. Rohrabacher introduced H.R. 1815 on June 13, 1995, and the bill was referred to the Committee on Science and in addition to the Committee on Resources. Within the Science Committee, the measure was referred to the Subcommittee on Energy and Environment, which met to markup a Subcommittee print of the legislation on June 8, 1995. The Subcommittee adopted three amendments: (1) Mr. Weldon's amendment to reinstate funding for Global Learning and Observations to Benefit the Environment (GLOBE); (2) Mr. Ehlers' amendment to remove two zebra mussel research accounts from the list of program terminations; and (3) Mr. Roemer's amendment (offered by Mr. McHale) to clarify the duties of the National Weather Service (NWS). The Subcommittee print was approved, as amended, by a roll call vote of 13 to 3, and the bill was reported to the Full Committee for further consideration.

The Full Committee met on June 28, 1995 to consider H.R. 1815. The Committee adopted an en bloc amendment offered by Mr. Walker, as amended by an amendment by Mr. Brown, to make clarifications and minor changes in authorization levels; prohibit the use of funds authorized by the bill for lobbying; and restrict eligibility for funding to those organizations which do not receive earmarked funds. The Walker en bloc amendment included three additional amendments: (1) Mr. Cramer's en bloc amendment to clarify the availability of funding for new NEXRAD installations; (2) Mr. Boehlert's amendment to maintain the existing ratio of intramural to extramural funding in NOAA climate research; and (3) Mr. Weldon's (PA) amendment to create a new section 203 of the bill "Use of Ocean Research Resources of Other Federal Agencies." The Committee also adopted an amendment offered by Mr. Walker, as amended by an amendment by Mr. Brown, to require the Secretary of Commerce to conduct a review of all NOAA laboratories. The Committee adopted two additional amendments: (1) Mr. Calvert's amendment to delete language terminating the National Weather Service Agriculture and Fruit Frost Program; and (2) Mr. Roemer's amendment to terminate the National Weather Service Marine

Facsimile Service. The Committee ordered H.R. 1815, as amended, to be reported to the House by voice vote.

Combined with six other authorization bills reported out by the Committee on Science into an omnibus authorization, H.R.1815 became Title IV of H.R. 2405, the Omnibus Civilian Science Authorization Act of 1995. Mr. Walker introduced H.R. 2405 on September 27, 1995, and the House of Representatives passed the bill on October 12, 1995, by a vote of 248 to 161. The Senate received H.R. 2405 on October 17, 1995 and referred the measure to the Committee on Commerce.

Committee Publication Number 104-10 and H. Rept. 104-237.

2.7—DEPARTMENT OF ENERGY CIVILIAN RESEARCH AND DEVELOPMENT ACT OF 1995 (H.R. 1816)

Background and summary of legislation

In 1992, Congress passed the Energy Policy Act of 1992, P.L. 102-486, which authorized numerous Department of Energy civilian energy research, development, demonstration and commercial application programs. In most cases, however, specific sums were authorized only for FY 1993 and FY 1994. Exceptions for programs under the Committee's jurisdiction include the Federal Energy Management Program, Codes and Standards, Alternative Fueled and Electric Vehicles, Solar International Program, Renewable Energy and Environmental Technology Transfer, Coal R&D, Electric and Magnetic Field (EMF) Research, and Nuclear Energy.

The lack of authorizations for the bulk of the DOE civilian programs under the Committee's jurisdiction and the mandate given to Congress by the American people to produce a balanced budget by the year 2002 dictated a need for comprehensive authorization legislation. The balanced budget mandate required substantial reductions to prior funding levels. H.R. 1816, the Department of Energy Civilian Research and Development Act of 1995, authorized appropriations for Fiscal Year (FY) 1996 for civilian research, development, demonstration, and commercial application activities of the Department of Energy. The authorization was based on extensive testimony received through four days of Subcommittee hearings held early in the first session of the 104th Congress.

In February 1995, the President transmitted to Congress a request of $5,688,027,000 for Department of Energy civilian research and development programs for FY 1996, an increase of $341,734,000, or 6.4 percent, over the FY 1995 estimate of $5,346,293,000. Also included in the President's FY 1996 budget request was the proposal to realign and downsize the Department of Energy "to reflect changing world conditions and changing demands on the Nation's science and technology infrastructure." The Administration estimated that the proposal would save more than $14.1 billion in outlays over the five-year period encompassing Fiscal Years 1996 through 2000—some $8.4 billion in program savings and $5.7 billion from asset sales.

On June 2, 1995, the Secretary of Energy provided Mr. Rohrabacher with information concerning a proposed FY 1996 budget amendment reducing the Department's request by a total of $207,556,000. However, the absence of a formal amendment, the

lack of detail in the Secretary's June 2 communication, and the limited time available prevented the Committee from making use of the proposed budget amendment in considering the authorization of DOE programs for FY 1996. In the absence of a clear message from the Administration, the Committee recommended an overall authorization level of $4,250,000,000 for FY 1996, a decrease of $ 1,438,027,000, or 25.3 percent, from the requested level, and a decrease of $1,096,293,000, or 20.5 percent, from the FY 1995 estimate. The Committee's recommendation is consistent with the amounts established in the House-passed Concurrent Resolution on the Budget for FY 1995 (H. Con. Res. 67), as well as the conference report on the Resolution.

Legislative history

The Subcommittee held a hearing on February 13, 1995, to receive testimony on ways to reduce spending in the research and development programs of the three agencies under its jurisdiction, including the Department of Energy. On February 14, 1995, the Subcommittee held a hearing to receive testimony on the DOE's Fiscal Year 1996 budget requests for energy R&D programs under the Subcommittee's jurisdiction. Witnesses from the DOE included: Ms. Christine A. Ervin, Assistant Secretary for Energy Efficiency and Renewable Energy; Ms. Patricia Fry Godley, Assistant Secretary for Fossil Energy; Dr. Tara J. O'Toole, Assistant Secretary for Environment Safety and Health; Rear Admiral Richard J. Guimond, Principal Deputy Assistant Secretary for Environmental Restoration and Waste Management; and Mr. Ray A. Hunter, Acting Deputy Director, Office of Nuclear Energy. During the February 14 hearing, outside witnesses testifying were Mr. Myron Gottlieb, Vice President of Natural Gas Supply Technology Development at the Gas Research Institute; Mr. Linden Blue, Vice Chairman of General Atomics; Dr. Amos E. Holt, Senior Vice President of Engineering for the American Society of Mechanical Engineers; and Mr. Michael L. Marvin, Director of Governmental and Public Affairs for the American Wind Energy Association.

The Subcommittee also held a hearing on the DOE's FY 1996 budget request for the Office of Energy Research (OER) on February 16, 1995. Witnesses included: Dr. John Peoples, Jr., Director of Fermi National Accelerator Laboratory; Dr. Nicholas P. Samios, Director of Brookhaven National Laboratory; Dr. Alvin W. Trivelpiece, Director of Oak Ridge National Laboratory; Dr. Alan Schriesheim, Director of Argonne National Laboratory; Dr. Charles V. Shank, Director of Lawrence Berkeley Laboratory; Dr. Robin Roy, Project Director of the Office of Technology Assessment (OTA); and Dr. David E. Baldwin, Associate Director for Energy at Lawrence Livermore National Laboratory. The Subcommittee heard additional testimony on the DOE's R&D programs on February 21, 1995 during testimony presented by Mr. Scott Sklar, Executive Director of the Solar Energy Industries Association, and Mr. Howard Geller, Executive Director of the American Council for an Energy-Efficient Economy.

Mr. Rohrabacher introduced H.R. 1816 on June 13, 1995, and the bill was referred to the Committees on Science and Commerce. Within the Science Committee, the measure was referred to the

Subcommittee on Energy and Environment, which met to markup a Subcommittee print of the legislation on June 8, 1995. The Subcommittee adopted three amendments to the measure: (1) Mr. Bartlett's amendment to increase the authorization for the AP600 light water reactor; (2) Mr. Davis' amendment to maintain programs at the National Institute for Petroleum and Energy Research; and (3) Mr. Davis' amendment to provide the Committee with an opportunity to increase authorizations in the event that budget caps were lifted. The Subcommittee print, as amended, was approved by a voice vote and ordered reported to the Full Committee for further consideration. The Full Committee met on June 20, 1995, to consider H.R. 1816. In addition to the substitute offered by Mr. Walker, the Committee accepted two additional amendments: (1) Mr. Foley's amendment to strike authorizing language for the Gas Turbine-Modular Helium Reactor (GTMHR); and (2) Ms. Lofgren's amendment to increase funding for Magnetic Fusion Energy operating and capital equipment. On June 22, 1995, the Committee agreed to H.R. 1816, as amended, by voice vote and ordered the bill to be reported to the House. Combined with six other authorization bills reported out of the Committee on Science into an omnibus authorization, H.R. 1816 became Title III of H.R. 2405, the Omnibus Civilian Science Authorization Act of 1995. H.R. 2405 was placed on the House calendar and passed the House of Representatives on October 12, 1995, by a vote of 248 to 161. The Senate received H.R. 2405 on October 17, 1995 and referred the measure to the Committee on Commerce.

Committee Publication Number 104-10 and H. Rep. 104-236.

2.8—FIRE ADMINISTRATION AUTHORIZATION ACT OF 1995 (H.R. 1851)

Background and summary of legislation

In 1974, Congress enacted the Federal Fire Protection and Control Act in response to a nationwide concern with loss of life and property from fires. The Act established the United States Fire Administration (USFA) in an effort to prevent and reduce the loss of life and property. The USFA coordinates the nation's fire safety and emergency medical service activities. The USFA works with state and local units of government to educate the public on fire prevention and control, collect and analyze data related to fire, promote the use of sprinkler systems in residential and commercial buildings, conduct research and development on fire suppression, promote firefighter health and safety, and coordinate with other federal agencies charged with emergency response activities.

The USFA also administers the National Fire Academy (NFA), which provides training to fire and emergency personnel in fire protection and control activities.

H.R. 1851, the National Fire Administration Authorization Act of 1995, authorizes appropriations for the activities of the USFA and the NFA for Fiscal Years 1996 and 1997. The bill is based on a hearing held on the National Fire Administration during the first session of the 104th Congress and authorizes $28 million in appropriations for Fiscal Years (FY) 1996 and 1997.

H.R. 1851 also amends section 31 of the Federal Fire Prevention and Control Act which requires the installation of hard-wired

smoke detectors in all multifamily housing owned or operated by the Federal Government by October 25, 1995. The bill extends this deadline for three years for housing controlled by the Department of the Army. In addition, H.R. 1851 requires the Administrator to inform the Congress 60 days prior to terminating or privatizing any USFA activities or programs. Finally, the bill directs the Administrator to submit a detailed report, three months after enactment, on what, if any, programs will be reduced or eliminated in order to meet the final appropriations levels.

Legislative history

Testifying before the Subcommittee during the FY 96 budget authorization hearing for the National Fire Administration on March 16, 1995 were: the Honorable Steny Hoyer, Representative from the 5th Congressional District of Maryland, and co-Chairman of the Congressional Fire Services Caucus; the Honorable Carrye Brown, Administrator of the U.S. Fire Administration, Federal Emergency Management Administration (FEMA); James F. Coyle, Deputy Superintendent, National Fire Academy, United States Fire Administration (USFA); Gary Tokle, Assistant Vice President for Public Fire Protection, National Fire Protection Association; Francis McGarry, President, National Association of State Fire Marshals; Bill Jenaway, President, Executive Board, Congressional Fire Services Institute; and Dan Shaw, Chief, Placitas, New Mexico Fire Department. All the witnesses testified to the success and importance of the United States Fire Administration.

H.R. 1851 was introduced by Mr. Schiff, Chairman of the Subcommittee on Basic Research, on June 15, 1995, and referred to the Committee on Science. Within the Science Committee, the measure was referred to the Subcommittee on Basic Research which met to markup a Subcommittee print of the legislation on June 14, 1995. The Subcommittee adopted three amendments to the Subcommittee print of H.R. 1851: Mr. Schiff offered an technical amendment to make current outdated fire standards and Mr. Weldon (PA) offered two amendments—(1) to insert a new section on privatization; and (2) to insert a new section requiring a report on USFA budget reduction. The Subcommittee approved the measure, as amended, by voice vote and reported the measure to the Full Committee for further consideration. The Full Committee met on June 28, 1995, to consider H.R. 1851. After accepting an additional clarifying amendment offered by Mr. Walker, the Committee approved the bill by voice vote and ordered it to be reported to the House. Combined with six other authorization bills reported out by the Science Committee into an omnibus authorization, H.R. 1851 became Title VII of H.R. 2405, the Omnibus Civilian Science Authorization Act of 1996. H.R. 2405 was introduced by Mr. Walker on September on September 27, 1995, and passed the House of Representatives on October 12, 1995, by a vote of 248 to 161. The Senate received H.R. 2405 on October 17, 1995 and referred the measure to the Committee on Commerce.

Committee Publication Number 104-7 and H. Rept. 104-235.

2.9—NATIONAL SCIENCE FOUNDATION AUTHORIZATION ACT OF 1995 (H.R. 1852)

Background and summary of legislation

The National Science Foundation is an independent federal agency established in 1950 to promote and advance scientific progress in the United States. The NSF Act of 1950 authorizes and directs NSF to initiate and support basic research and programs to strengthen research potential and education at all levels in the sciences and engineering. Although the NSF budget is only four percent of the total federal R&D budget, the Foundation makes an important contribution to the nation's science and technology enterprise. NSF builds U.S. scientific strength by funding research and education activities at more than 2,000 colleges and universities and other research institutions in all areas of the United States.

H.R. 1852, the National Science Foundation Authorization (NSF) Act of 1995, authorizes $3,126,000,000 for FY 96 and $3,171,400,000 for FY 97. In addition, H.R. 1852 establishes new requirements for NSF preparation of a strategic plan; eliminates one or more of NSF's directorates; places a funding ban on institutions which receive appropriations earmarks; requires options for a 10 percent reduction in the proportion of federal indirect costs; prohibits expenditure of unauthorized funds for construction of major national research facilities; subjects temporary NSF employees to the same financial disclosure requirements as permanent employees; directs NSF to consider the impact of research grants on undergraduate science education; and redesignates the Critical Technologies Institute as the Science Studies Institute, with a refined mission, and places limits on NSF funding.

H.R. 1852, as amended, imposes new requirements on the NSF for long-range program planning and organization. The NSF Act of 1950 is amended by transforming the existing NSF annual report to Congress into a 3-year strategic plan to be updated annually. In addition, NSF is required to prepare and submit annually to Congress a 5-year plan for new construction, repair, and upgrades to National Research Facilities (major research facilities and equipment, such as telescopes, which are available for use by researchers throughout the world). The bill prohibits obligation of funds appropriated for national facilities costing in excess of $50 million, unless the project for which the funds are to be expended has been explicitly authorized.

H.R. 1852, as amended, establishes eligibility criteria for certain NSF program activities. With certain exceptions, the Director shall exclude from consideration for awards made by NSF after Fiscal Year 1995 any person who receives federal funds for a project that was not subjected to a competitive, merit-based award process. Relative to awards from NSF, H.R. 1852 requires that grant documents include a statement of the current NSF policy that NSF-supported research facilities should not be used in fee-for-service competition with private companies that provide equivalent services.

Legislative history

The Subcommittee held authorization hearings for NSF on February 22 and March 2, 1995. On February 22, 1995, the Sub-

committee held the first authorization hearing which featured the testimony of Dr. Neal Lane, Director of the National Science Foundation (accompanied by Dr. Anne Peterson, Dr. Luther Williams and Dr. Neal Sullivan). The March 2 authorization hearing included testimony from Dr. Julian Wolpert, Professor of Geography, Public Affairs and Urban Planning, Princeton University—representing the Consortium of Social Science Associations; Dr. Richard Herman, Dean, College of Computer, Mathematical, and Physical Sciences, University of Maryland, and Chairman of the Joint Policy Board for Mathematics; Dr. Roland Schmitt, Chairman, American Institute of Physics—representing the Executive Committee, Council of Scientific Society of Presidents; James E. Sawyer, Senior Vice President and Chairman, Greiner Engineering, Inc.—representing the American Association of Engineering Societies; Dr. Corneilius J. Pings, President, Association of American Universities—representing the National Association of State Universities and Land Grant Colleges; Dr. Rita Colwell, President, University of Maryland Biotechnical Institute and American Association for Advancement of Science; Dr. Pamela Ferguson, President, Grinnell College—representing the Associated Colleges of the Midwest, Great Lakes Colleges Association, and Central Pennsylvania Consortium; and Erich Bloch, Distinguished Fellow, Council on Competitiveness, and former Director, NSF.

H.R. 1852 was introduced by Mr. Schiff, Chairman of the Subcommittee on Basic Research, on June 15, 1995, and referred to the Committee on Science. Within the Science Committee, the measure was referred to the Subcommittee on Basic Research which met to markup a Subcommittee print of H.R. 1852 on June 8, 1995. The Subcommittee adopted three amendments: (1) a technical amendment to the lobbying prohibition section offered by Mr. Schiff; (2) an amendment offered by Mr. Boehlert to ensure that the impact a grant would have on undergraduate and graduate education be taken into consideration during any award decision; and (3) a substitute offered by Mr. Schiff (to the amendment offered by Mr. Geren) that would allow for further authorizations for NSF pending the outcome of a budget conference resolution. The measure, as amended, was adopted by voice vote and ordered to be reported to the Full Committee for further consideration. The Full Committee met on June 28, 1995, to consider H.R. 1852. The Committee accepted additional amendments, offered by Mr. Brown and Mr. Boehlert, as part of the en bloc amendment offered by Mr. Walker and adopted by unanimous consent to be considered as original text for purposes of amendment. The Committee agreed by voice vote to H.R. 1852, as amended, and ordered the measure to be reported to the House. Combined with six other authorization bills reported out by the Science Committee into an omnibus authorization, H.R. 1851 became Title I of H.R. 2405, the Omnibus Civilian Science Authorization Act of 1996. H.R. 2405 was introduced by Mr. Walker on September on September 27, 1995, and passed the House of Representatives on October 12, 1995, by a vote of 248 to 161. The Senate received H.R. 2405 on October 17, 1995, and referred the measure to the Committee on Commerce.

Committee Publication Number 104-6 and H. Rept. 104-231.

2.10—AMERICAN TECHNOLOGY ADVANCEMENT ACT OF 1995 (H.R. 1870)

Background and summary of legislation

The purpose of the bill is to authorize Fiscal Year 1996 appropriations for the activities of the Under Secretary of Commerce for Technology, and for Scientific and Technical Research and Services and Construction of Research Facilities activities of the National Institute of Standards and Technology, and other purposes.

Technology is the engine of economic growth and has perhaps never been more important to our nation's well-being. Within the Department of Commerce, both the Technology's Administration and the National Institute of Standards and Technology strive to promote technological innovation and our nation's future competitiveness.

H.R. 1870, the American Technology Advancement Act of 1995, provides an authorization for Fiscal Year 1996 appropriation for the Technology Administration and National Institute of Standards and Technology's (NIST) Scientific and Technical Research and Services, as well as Construction of Research Facilities. The authorization levels in H.R. 1870 are guided in principle by H. Con. Res. 67, the Concurrent Resolution on the Budget.

H.R. 1870 also contains recommended language intended to clarify or extend NIST authority to perform certain important administrative functions, including the following: permanently extend the NIST personnel demonstration project; increase the participant cap on post-doctoral fellows; provide authority to donate excess scientific equipment to secondary schools; create authority for a Metro shuttle for NIST employees; and restate existing authorities for NIST activities in standards and conformity assessment to incorporate requirements for NIST to survey existing practices and report to Congress on recommendations for improvements in these activities.

The Committee believes that H.R. 1870 meets the Committee's responsibility to set priorities and reflects a strong commitment to both fundamental scientific research vital to the nation's future, and balance the federal budget.

Legislative history

On March 23, 1995, the Subcommittee on Technology held hearings on the Fiscal Year 1996 budget for the Technology Administration and NIST. The following witnesses testified before the Subcommittee: Dr. Mary Good, Under Secretary of Technology, Department of Commerce; Dr. Arati Prabhakar, Director of NIST; Ms. Cynthia Beltz, Research Fellow for the American Enterprise Institute; Dr. Edward Hudgins, Director of Regulatory Studies for the Cato Institute; Ms. Laurie Conner, Vice-President of Percepton, Inc.; Mr. Arthur Cassie, President and CEO of Cubicon, Inc.; Mr. David Gibson, President of X-Ray Optical Systems; Ms. Jan Pounds, Director of Massachusetts Manufacturing, Bay State Skills Corporation; Mr. Leo Reddy, President of the National Coalition for Advanced Manufacturing; and Mr. Larry Rhoades, President of Extrude Hone Corporation. (See Committee Publication 104-5)

On June 16, 1995 the Subcommittee on Technology convened to mark up the Subcommittee print of the "American Technology Ad-

vancement Act of 1995," providing authorization for appropriations for the Technology Administration and NIST. Of the five amendments offered, three were defeated by roll call votes and two were adopted by voice votes. Mrs. Morella moved that the Subcommittee print, as amended, be ordered reported to the Full Committee for consideration. The motion was adopted by voice vote.

On June 28, 1996, the Full Committee convened to mark up H.R. 1870, the "American Technology Advancement Act of 1995," which authorizes funding for Fiscal Year 1996 for the Department of Commerce's Technology Administration (TA) at $5,066,000 and for the core Scientific and Technical Research and Services (STRS) and the Construction of Research Facilities (CRF) activities for NIST at $275,579,000 and $62,055,000 respectively. The bill was adopted, as amended, by voice vote, and was ordered reported to the Full House for consideration.

On August 4, 1995, H.R. 1870 was reported to the House (Amended). House Report 104-232. H.R. 1870, along with six other authorization bills reported out of the Committee on Science, was rolled into H.R. 2405, the Omnibus Civilian Science Authorization Act of 1995. H.R. 2405 was introduced by Mr. Walker on September 27, 1995, and passed the House of Representatives on October 12, 1995, by a vote of 248 to 161. The Senate received H.R. 2405 on October 17, 1995 and referred the measure to the Committee on Commerce.

2.11—NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AUTHORIZATION ACT, FY 1996 (H.R. 2043)

Background and summary of legislation

The National Aeronautics and Space Administration (NASA) was established as a result of the National Aeronautics and Space Act of 1958. NASA conducts research for the solution of problems of flight within and outside the Earth's atmosphere and develops, constructs, tests, and operates aeronautical and space transportation vehicles. It conducts activities required for the exploration of space with manned and unmanned vehicles and arranges for the most effective utilization of the scientific and engineering resources of the United States with other nations engaged in aeronautical and space activities for peaceful purposes. The purpose of this bill is to authorize appropriations for Fiscal Year 1996 for all programs within NASA except the International Space Station. The bill also authorizes the Office of Commercial Space Transportation within the Department of Transportation and the Office of Space Commerce within the Department of Commerce. The International Space Station was authorized in H.R. 1601, the International Space Station Authorization Act of 1995 (H. Rept. 104-210, filed July 28, 1995).

The U.S. space program is at a critical point in its history. With the collapse of the Cold War, it no longer serves the explicit geopolitical purposes for which it was created and subsequently, enjoys less popular support from a public that no longer sees the need for space activity to demonstrate superiority over the Soviet Union. At the same time, there is general support for civil space activities and the recognition that the civil space program's scientific and

technical contributions to the country have been and will continue to be of great significance. Thus, the civil space program finds itself at a crossroads. It has completed its Cold War mission successfully and must seek to contribute to America's future in new ways.

Two other developments will affect the evolution of the U.S. space program. First, federal space policies and projects must be designed and implemented within the framework of progress towards and maintenance of, a balanced federal budget as well as other important economic, domestic, and foreign policy goals of the United States. Thus, federal outlays for the civil space program through NASA can be expected to decline for several years. As a result, NASA is in the midst of a reorganization to adjust to the end of the Cold War, accommodate lower budgets than anticipated in the late 1980's, and lay the foundation for a National Aeronautics and Space Administration that can take the United States into the next century. The Committee is in general agreement with NASA Administrator Daniel Goldin that non-essential or obsolete programs, activities, and infrastructure should be redirected, privatized, or canceled during the course of this reorganization.

Second, near-Earth space is no longer the completely unknown and foreign environment it was at the point of NASA's creation in 1958, but is rather a frontier with abundant energy and material resources analogous to the positive characteristics of the early American frontier. This is most apparent in the rapid and continuing rise of a commercial space industry and the transition of NASA from its scientific research and technology focus towards the orientation of an operational agency. These two developments are working at cross-purposes. The rise of a commercial space industry suggests that NASA no longer needs to operate large, continuous systems and can instead focus on leading-edge scientific research. The Omnibus Civilian Science Authorization Act of 1996, begins the process of moving NASA in these new directions.

Legislative history

The Subcommittee on Space and Aeronautics held two formal hearings for the Fiscal Year 1996 NASA authorization. On February 13, 1995, the Subcommittee on Space and Aeronautics held a hearing to review the budgets of the National Aeronautics and Space Administration (NASA), the Office of Commercial Space Transportation (OCST), and the Office of Space Commerce (OSC). Witnesses included: Mr. Daniel S. Goldin, NASA's Administrator; Mr. Frank C. Weaver, Director of OCST at the Department of Transportation (DOT); and Mr. Keith Calhoun-Senghor, Director of OSC at the Department of Commerce.

On March 16, 1995 the Subcommittee on Space and Aeronautics held its second hearing regarding the Fiscal Year 1996 NASA Authorization. The hearing reviewed, in detail, NASA program budgets with testimony from non-agency witnesses. Specifically, there were six panels of witnesses that reviewed: (1) Restructuring NASA; (2) International Space Station and Space Shuttle; (3) Reusable Launch Vehicles (RLV); (4) Aeronautics and Technology; (5) Mission To Planet Earth (MTPE); and (6) Space Science. Witnesses included: Mr. David H. Moore, Principal Analyst for the Congressional Budget Office's Natural Resources and Commerce Division;

Mr. Wolfgang Demisch, of Bankers Trust; Mr. Rick Tumlinson, President of the Space Frontier Foundation; Mr. Gerald M. May, Assistant Director for the National Legislative Commission at the American Legion; Mr. Richard H. Kohrs, Director, Center for International Aerospace Cooperation; Mr. Norman R. Parmet, Chairman of the Aerospace Safety Advisory Panel; Dr. Hans Mark, Professor of Aerospace Engineering and Engineering Mechanics at the University of Texas at Austin; Dr. Maxime A. Faget, founder of Space Industries, Inc.; Ms. Lori Garver, Executive Director of the National Space Society; Mr. Robert G. Minor, President, Space Systems Division of Rockwell International; Mr. Jerry Pournelle, from the Citizen Advisory Council on National Space Policy; Mr. Bob Citron, President and CEO of Kistler Aerospace Corporation; Dr. Jerry Grey, Director of Aerospace and Science Policy at the American Institute of Aeronautics and Astronautics; Mr. Robert Spitzer, Vice President of Engineering at Boeing; Dr. Scott Pace, Chair of the Policy Committee at the National Space Society; Mr. Charles W. Hayes, National Program Manager for Cray Research; Dr. James G. Anderson, Professor, Department of Earth and Planetary Sciences at Harvard University; Mr. Eric J. Barron, Director of the Earth Systems Science Center at Pennsylvania State University; Mr. Jack L. Brock, Jr., Director of Information Resource Management/National Security and International Affairs at the General Accounting Office; Dr. Edward Teller, Lawrence Livermore National Laboratory; Dr. Arthur Charo, Senior Analyst, International Security and Space Program, Office of Technology Assessment; Dr. Francis Everitt, Gravity Probe B Office, Hansen Experimental Physics Lab; Dr. William Boynton, Chairman of the Space Science Working Group at the University of Arizona; Dr. Dan Lester, Research Scientist for the Department of Astronomy and McDonald Observatory at the University of Texas at Austin; and Mr. David Gump, President of Luna Corporation.

H.R. 2043, the National Aeronautics and Space Administration Authorization Act for Fiscal Year 1996, was introduced by Chairman Robert S. Walker and Subcommittee on Space and Aeronautics Chairman F. James Sensenbrenner, Jr. on July 17, 1995. H.R. 2043 was solely referred to the Committee on Science and subsequently referred to the Subcommittee on Space and Aeronautics. On July 19, 1995, the Subcommittee ordered the bill reported, as amended, by a voice vote to the Full Committee for further consideration. On July 25, 1995, the Full Committee adopted, as amended, H.R. 2043, by a voice vote and the bill was ordered reported (H. Rept. 104-233) to the House for consideration. H.R. 2043 became Title II of H.R. 2405, the Omnibus Civilian Science Authorization Act of 1995. H.R. 2405 was introduced by Chairman Walker on September 27, 1995. It was referred to the Committee on Science and, in addition, to the Committees on Commerce and Resources for those provisions under their jurisdiction. On September 29, 1995, the Committee on Rules discharged, by adoption of H. Res 234, the Committees of jurisdiction from further consideration of H.R. 2405, and granted an open rule. Since each title within H.R. 2405 was reported out of the Committee on Science separately, there was no report filed by the Committee. H.R. 2405 was considered in the House on October 11 and 12, 1995. On October

12, 1995, H.R. 2405 passed the House, as amended, by the Yeas and Nays: 248—161. H.R. 2405 was received in the Senate on October 17, 1995 and referred to the Senate Committee on Commerce, Science and Transportation. The Senate took no formal action on this legislation, however the Senate did pass S. 1048, the National Aeronautics and Space Administration Authorization Act for Fiscal Year 1996.

2.12—OMNIBUS CIVILIAN SCIENCE AUTHORIZATION ACT OF 1995 (H.R. 2405)

Background

H.R. 2405 consists of seven separate titles as follows: Title I B National Science Foundation (H.R. 1852); Title II B National Aeronautics and Space Administration (H.R. 2043); Title III B Department of Energy (H.R. 1816); Title IV B National Oceanic and Atmospheric Administration (H.R. 1815); Title V B Environmental Protection Agency (H.R. 1814); Title VI B National Institute of Standards and Technology's Technology Administration (H.R. 1870); and, Title VII B United States Fire Administration (H.R. 1851). See write-ups on these bills under appropriate subcommittee headings in this section as each bill, or title of H.R. 2405, was reported out of the Committee separately.

Legislative history

H.R. 2405 was introduced by Chairman Walker on September 27, 1995. It was referred to the Committee on Science and, in addition, to the Committees on Commerce and Resources for those provisions under their jurisdiction. On September 29, 1995, the Committee on Rules discharged, by adoption of H. Res. 234, the Committees of jurisdiction from further consideration of H.R. 2405, and granted an open rule. Since each title within H.R. 2405 was reported out of the Science Committee separately, there was no report filed by the Committee on H.R. 2405. On October 11, 1995, the House passed the Rule and began consideration of H.R. 2405. It was considered on October 11 and 12, 1995. On October 12, 1996, H.R. 2405 passed the House, with amendments, by a recorded vote of Yeas—248 to Nays—161. H.R. 2405 was received in the Senate on October 17, 1995, and referred to the Senate Committee on Commerce, Science and Transportation. The Senate took no formal action on this legislation.

2.13—NATIONAL OCEANOGRAPHIC PARTNERSHIP ACT (H.R. 3303; SEE ALSO P.L. 104-201/H.R. 3230 IN CHAPTER I)

Background and summary and legislative history

On April 23, 1996, Mr. Weldon (PA), introduced H.R. 3303, the National Oceanographic Partnership Act. The bill was referred to the Committees on National Security, Resources, and Science.

The bill establishes the National Oceanographic Partnership Program and sets forth the purposes of the program. It establishes the: (1) National Ocean Research Leadership Council; (2) Ocean Research Partnership Coordinating Group; and (3) Ocean Research Advisory Panel under the program. It also sets forth the composition of membership and specified duties of each. In addition, it

mandates annual reports to Congress, and authorizes appropriations for the National Oceanographic Partnership Program for FY 1997.

The full Science Committee met to mark up a Committee print for H.R. 3322 on April 24, 1996. The Committee print included a modified version of H.R. 3303 (which included no new authorizations) as part of Title IV. The Full Committee approved the Committee print, as amended, by a recorded vote of yeas—24 to nays—19, and ordered it reported. A motion was then adopted to prepare a clean bill for introduction in the House, and that the measure be deemed reported by the Committee. The Committee filed House Report 104-550, part 1, on May 1, 1996. On May 6, 1996, the Committees on Resources, Transportation and Infrastructure, and National Security discharged H.R. 3322 from further consideration.

On May 7, 1996, the Committee on Rules granted an open rule, adopting H. Res. 427. On May 9, 1996, the House passed the rule. H.R. 3322 was called up by the House under an open rule on May 29, 1996, with the Committee Amendment in the Nature of a Substitute considered as an original bill for the purpose of amendment. The amendment stripped the bill of the provisions from H.R. 3303 which had been incorporated into H.R. 3230, the National Defense Authorization Act for Fiscal Year 1997.

On July 30, 1996, modified provisions of H.R. 3303 were incorporated in subtitle E of Title II of H.R. 3230. H.R. 3230 was introduced by Mr. Spence (by request) on April 15, 1996, and referred to the House Committee on National Security. On May 1, 1996, the National Security Committee marked-up the measure and ordered it to be reported (amended) by the yeas and nays: 49—2 (Report No: 104-563). On May 15, 1996, the bill passed the House (Amended) by recorded vote: 272—153 (Record Vote No: 174). On July 10, 1996, the Senate struck all after the enacting clause and substituted the language of S. 1745 amended; it passed Senate (amended) by unanimous consent; the Senate insisted upon its amendments; the Senate requested a conference; and appointed conferees.

On July 17, 1996, the House disagreed to the Senate amendments by voice vote; agreed to conference; the Speaker appointed conferees from the Committee on National Security for consideration of the House bill and the Senate amendment, and modifications committed to conference; and the Speaker appointed additional conferees from: the Committee on Science (Walker, Sensenbrenner, and Harman), for consideration of sections 203, 211, 245, and 247 of the House bill, and sections 211, 251-252, and 1044 of the Senate amendment, and modifications committed to conference; the Permanent Select Committee on Intelligence for consideration of matters within the jurisdiction of that committee under clause 2 of rule XLVIII; the Committee on Banking and Financial Services for consideration of sections 1085 and 1089 of the Senate amendment, and modifications committed to conference; the Committee on Commerce for consideration of sections 601, 741, 742, 2863, 3154, and 3402 of the House bill, and sections 345-347, 561, 562, 601, 724, 1080, 2827, 3175, and 3181-91 of the Senate amendment, and modifications committed to conference; the Committee on Economic and Educational Opportunities for consideration of sections

572, 1086, and 1122 of the Senate amendment, and modifications committed to conference; the Committee on Government Reform and Oversight for consideration of sections 332-36, 362, 366, 807, 821-25, 1047, 3523-39, 3542, and 3548 of the House bill, and sections 636, 809(b), 921, 924-25, 1101, 1102, 1104, 1105, 1109-1134, 1081, 1082, 1401-34, and 2826 of the Senate amendment, and modifications committed to conference; the Committee on International Relations, for consideration of sections 233-234, 237, 1041, 1043, 1052, 1101-05, 1301, 1307, 1501-53 of the House bill, and sections 234, 1005, 1021, 1031, 1041-43, 1045, 1323, 1332-35, 1337, 1341-44, and 1352-54 of the Senate amendment, and modifications committed to conference; the Judiciary, for consideration of sections 537, 543, 1066, 1080, 1088, 1201-16, and 1313 of the Senate amendment, and modifications committed to conference; the Committee on Resources, for consideration of sections 247, 601, 2821, 1401-14, 2901-13, and 2921-31 of the House bill, and sections 251-52, 351, 601, 1074, 2821, 2836, and 2837 of the Senate amendment, and modifications committed to conference; the Committee on Transportation and Infrastructure, for consideration of sections 324, 327, 501, and 601 of the House bill, and sections 345-348, 536, 601, 641, 1004, 1009-1010, 1311, 1314, and 3162 of the Senate amendment, and modifications committed to conference; the Committee on Veterans' Affairs for consideration of sections 556, 638, and 2821 of the House bill, and sections 538 and 2828 of the Senate amendment, and modifications committed to conference; the Committee on Ways and Means, for consideration of sections 905, 1041(c)(2), 1550(a)(2), and 3313 of the House bill, and sections 1045(c)(2), 1214 and 1323 of the Senate amendment, and modifications committed to conference. On July 18, 1996, the Senate amendment was deleted from the panel appointed from the Committee on Commerce; the Panel from the Committee on Commerce was also appointed for the consideration of section 3174 of the Senate amendment, and modifications committed to conference; and the panel from the Committee on Science was also appointed for the consideration of section 1044 of the Senate amendment, and modifications committed to conference.

On July 30, 1996, the Conference filed its report (Conference Report H. Rept. 104-724). The Conference report included Subtitle E of Title II: National Oceanographic Partnership Program. Subtitle E directs the Secretary of the Navy to establish the National Oceanographic Partnership Program for promoting the goals of assuring national security, advancing economic development, protecting quality of life, and strengthening science education and communications through improved knowledge of the ocean. Establishes a National Ocean Research Leadership Council, which shall: (1) prescribe policies and procedures, and provide reviews and assessments, concerning the program's implementation; (2) submit annual reports to the Congress; (3) establish a partnership program office; and (4) establish the Ocean Research Advisory Panel. The subtitle requires related reports and authorizes $20.5 million for carrying out the program. On August 1, 1996, the House Agreed to Conference Report by yea-nay vote: 285—132 (Record Vote No: 397). On September 10, 1996, the Senate agreed to the conference report by Yea-Nay Vote: 73—26 (Record Vote No: 279); and the

measure was cleared for the White House. On September 23, 1996, the President signed the measure (Public Law No. 104-201).

2.14—OMNIBUS CIVILIAN SCIENCE AUTHORIZATION ACT OF 1996 (H.R. 3322)

The Omnibus Civilian Science Authorization Act of 1996 authorizes $19.7 billion for most programs and missions under the jurisdiction of the Science Committee. The Department of Energy programs for FY97 were not authorized in this bill, as these authorizations were passed by the House on October 12, 1995 as part of H.R. 2405, the Omnibus Civilian Science Authorization Act of 1995. (See write-ups on H.R 2043—NASA, H.R. 1870—NIST, H.R. 1852—NSF, H.R. 1851—USFA, H.R. 1816—DOE, H.R. 1815—NOAA, and H.R. 1814—EPA.)

Background (By Title)

Title I—National Science Foundation—The National Science Foundation (NSF) was established as an independent agency by the National Science Foundation Act of 1950 (42 U.S.C. 1861-1875). The purposes of the Foundation are: to increase the nation's base of scientific and engineering knowledge and strengthen its ability to conduct research in all areas of science and engineering; to develop and help implement science and engineering education programs that can better prepare the nation for meeting the challenges of the future; and to promote international cooperation through science and engineering. In its role as a leading federal supporter of science and engineering, the agency also has an important role in national policy planning. NSF promotes the progress of science and engineering through the support of research and education programs. Its major emphasis is on high-quality, merit-selected research—the search for improved understanding of the fundamental laws of nature upon which our future well-being as a nation depends. Its educational programs are aimed at ensuring increased understanding of science and engineering at all educational levels, maintaining an adequate supply of scientists, engineers, and science educators to meet our country's needs. Title I authorizes funding for the National Science Foundation for FY97, providing real growth in the Research and Related Activities account, reducing the number of research directorates from seven to six, ending academic earmarks, and continuing strong support for science, math and engineering education.

Title II—National Aeronautics and Space Administration—The National Aeronautics and Space Administration (NASA) was established as a result of the National Aeronautics and Space Act of 1958, as amended. NASA conducts research for the solution of problems of flight within and outside the Earth's atmosphere and develops, constructs, tests, and operates aeronautical and space vehicles. It conducts activities required for the exploration of space with manned and unmanned vehicles and arranges for the most effective utilization of the scientific and engineering resources of the United States with other nations engaged in aeronautical and space activities for peaceful purposes. Title II authorizes funding for the National Aeronautics and Space Administration for FY97, focusing efforts on maintaining safety in the shuttle program, fully

funding the International Space Station, increasing funding for space science and ending corporate welfare.

Title III—United States Fire Administration—In 1974, Congress enacted the Federal Fire Prevention and Control Act in response to a nationwide concern with the loss of life and property from fires. The Act established the United States Fire Administration (USFA) in an effort to prevent and reduce this loss of life and property. The USFA coordinates the nation's fire safety and emergency medical service activities. The USFA works with state and local units of government to educate the public on fire prevention and control, collect, and analyze data related to fire, promote the use of sprinkler systems in residential and commercial buildings, conduct research and development on fire suppression, promote firefighter health and safety, and coordinate with other federal agencies charged with emergency response activities. The USFA also administers the National Fire Academy (NFA), which provides training to fire and emergency service personnel in fire protection and control activities.

During the first session of the 104th Congress, the House passed H.R. 1851, which was a two-year authorization for the USFA. Except for a change in the authorization funding level for FY 1997 from $28 million to $27.56 million, to conform to the Administration's FY 1997 request, this title includes the text of H.R. 1851.

Title IV—National Oceanic and Atmospheric Administration—(Section 453 became Public Law 104-201/ see H.R. 3303). The National Oceanic and Atmospheric Administration (NOAA), was formed on October 3, 1970, by Reorganization Plan No. 4 of 1970 (5 U.S.C. app.) under the Nixon Administration. NOAA's mission is to explore, map, and chart the global ocean and its living resources and to manage, use, and conserve those resources; to describe, monitor, and predict conditions in the atmosphere, ocean, sun, and space environment; to issue warnings against impending destructive natural events; to assess the consequences of inadvertent environmental modification over several scales of time; and to manage and disseminate long-term environmental information. NOAA has obtained most of the funding for its programs over the past twenty years through direct appropriation without annual legislative authorization.

NOAA programs under the jurisdiction of the Science Committee include all of the National Weather Service, the Office of Oceanic and Atmospheric Research (OAR), the National Environmental Satellite, Data, and Information Services (NESDIS), and portions of the National Oceans Service (NOS).

In the 98th Congress, legislation authorizing NOAA activities for FY 1984, S. 1097, was vetoed on October 19, 1984. In the 99th Congress, the Consolidated Omnibus Budget Reconciliation Act of 1986 (Public Law 99-272) authorized various NOAA activities, including nautical and aeronautical chart programs, marine research and monitoring, ocean pollution research, and weather modification research. During the 100th Congress, provisions authorizing Fiscal Year 1989 appropriations for NOAA's satellite, atmospheric, and weather programs (previously approved by the House of Representatives and the Senate as S. 1667) were included in Title IV of S. 2209, the National Aeronautics and Space Administration Author-

ization Act for FY 1989, which was signed into law on November 17, 1988 (Public Law 100-685).

During the 102nd Congress, the first comprehensive NOAA authorization bill was approved and signed into law, the National Oceanic and Atmospheric Administration Authorization Act of 1992 (Public Law 102-567). With three exceptions, Public Law 102-567 only authorized funding for Fiscal Years 1992 and 1993. The exceptions are portions of the Next Generation Weather Radar (NEXRAD) program and the Geostationary Operational Environmental Satellite (GOES) program which are authorized to completion, and NOAA Fleet Modernization which is authorized through FY 1997. No comprehensive NOAA authorization bills have been signed into law since the 102nd Congress. Title IV funds those activities of the National Oceanic and Atmospheric Administration for FY97 that are under the jurisdiction of the Science Committee, privatizes NOAA's fleet, phases out the NOAA Corps, reforms the National Weather Service Organic Act and streamlines NOAA operations.

Title V—Environmental Protection Agency—(Drinking water provisions became Public Law 104-182/see H.R. 3604/S. 1316). The Environmental Protection Agency (EPA) was established in the executive branch as an independent agency pursuant to Reorganization Plan No. 3 of 1970 (5 U.S.C. app.), effective December 2, 1970, by President Nixon. It was created to permit coordinated and effective governmental action on behalf of the environment, and was designed to serve as the public's advocate for a livable environment. The Agency's mission is to control and abate pollution in the areas of air, water, solid waste, pesticides, radiation, and toxic substances. Its mandate is to mount an integrated, coordinated attack on environmental pollution in cooperation with State and local governments.

EPA's Office of Research and Development is responsible for EPA's in-house and extramural research programs. The Office of Research and Development's budget represents the majority of the new Science & Technology (S&T) Appropriations account.

The Office of Research and Development controls twelve research laboratories and four assessment offices. These assets have been reorganized to fall under the management of three national laboratories and two national centers. They are the National Health and Environmental Effects Research Laboratory (NHEERL) in Triangle Park, NC, the National Exposure Research Laboratory (NERL) in Triangle Park, NC, the National Risk Management Laboratory (NRML) in Cincinnati, OH, the National Center for Environmental Research Quality Assurance (NCERQA) and the National Center for Environmental Assessment (NCEA), both of which are located in Washington, DC.

The Science and Technology Appropriations account also includes appropriations for the following non-Office of Research and Development Laboratories: National Vehicles and Fuels Emission Laboratory, National Radiation Laboratories, Analytical and Environmental Chemistry Laboratories, Drinking Water Program Laboratory, and National Enforcement Investigations Center.

Currently the programs of the Office of Research and Development are unauthorized. The last authorization for the Office of Re-

search and Development, the Environmental Research, Development and Demonstration Act of 1981 (P.L. 96-569), expired on September 30, 1981. Title V authorizes funding for the Environmental Protection Agency for FY97, and emphasizes refocusing EPA's core mission of conducting research in support of EPA's regulatory functions.

Title VI—National Institute of Standards and Technology—Title VI of H.R. 3322 provides an authorization for FY 1997 appropriations for the National Institute of Standards and Technology's (NIST) Scientific and Technical Research Services (STRS), as well as for Construction of Research Facilities.

NIST's mission is to promote economic growth by working with industry to develop and apply technology, measurements, and standards. This mission is integral to our nation's competitiveness in the global marketplace. Established by Congress in 1901 as the National Bureau of Standards, NIST is the nation's oldest federal laboratory. The Omnibus Trade and Competitiveness Act of 1988 (P.L. 100-48) renamed the laboratories to NIST, and added new responsibilities to NIST's mission. NIST, which is part of the Department Commerce, supplements its appropriated funds with contributions from industry, and payments for contracts from other government agencies. Title VI authorizes funds for the National Institute of Standards and Technology for FY97 focusing on eliminating corporate welfare and returning NIST to its core mission of working with industry to enhance competitiveness through technology.

Title VII—Federal Aviation Administration, R,E&D—(Became Public Law 104-264/ see H.R. 3484). Title VII of H.R. 3322 authorizes Fiscal Year 1997 appropriations for the activities for the Federal Aviation Administration's (FAA) research, engineering and development programs; and mandates the guiding principles for the conduct of research, engineering and development activities.

The FAA was created in 1958 to develop air commerce and promote safety in the air. As part of the Airport Development and Airway Trust fund established by Congress in 1982, it was decided that a comprehensive research and development program was necessary at FAA to maintain a safe, efficient air traffic system. In order to fund both these research and development programs and improve airport and airways capital improvements, a series of user fees and taxes were established.

The 100th Congress, seeking to strengthen the FAA research and development programs, enacted the 1988 Aviation Safety Research Act P.L. 100-591. This bill created the FAA Research, Engineering and Development Advisory Board. The terrorist bombing of Pan Am Flight 103 demonstrated the need for new technology to detect explosives; and, Congress subsequently passed the Aviation Safety Improvement Act of 1990 which required FAA to support activities to accelerate the research and development of new technologies to protect against terrorism.

As directed by P.L. 104-50, the FAA recently began phasing in a new acquisition management system. FAA programs have experienced significant problems in costs, schedules, and performance. Title VII authorizes funds for the Federal Aviation Administration's research and development functions for FY97 under the juris-

diction of the Science Committee and emphasizes the importance of R&D in technology, and implementation, to reduce hazards connected to airports and air travel.

Title VIII—National Earthquake Hazards Reduction Program—Earthquakes kill more people and destroy more property than any other natural disaster. Over the past fifteen years, earthquakes have caused over 100,000 deaths and hundreds of billions of dollars in economic losses worldwide. Because much of these losses can be prevented or reduced through promulgation of adequate zoning and building codes, emergency planning, public education and prompt response, Congress established the National Earthquake Hazards Reduction Program (NEHRP).

Since its inception in 1977, NEHRP endeavors to reduce earthquake hazards and risk through research, development, and implementation. The program combines the efforts of four federal agencies—the Federal Emergency Management Agency, the United States Geological Survey, the National Science Foundation, and the National Institute of Standards and Technology.

The NEHRP has been reauthorized eight times since the originating legislation, P.L. 95-124. Two of these reauthorizations made significant policy changes. Title VIII authorizes funds for the National Earthquake Hazards Reduction Program for FY97, focusing on earthquake hazards mitigation.

Legislative history

H.R. 3322 was introduced by Chairman Walker, along with Subcommittee Chairs Sensenbrenner, Morella, Rohrabacher and Schiff, on April 25, 1996. It was referred to the Committee on Science and, in addition, to the Committees on National Security, Resources, and Transportation and Infrastructure, for those provisions under their jurisdiction. Each Subcommittee held its own authorization hearings for those programs under its purview.

Subcommittee on Basic Research

On March 22, 1996, the Subcommittee on Basic Research held a hearing titled, "National Science Foundation (NSF) FY97 Authorization," and received testimony from Dr. Neal Lane, Director of NSF, on NSF's FY 1997 budget request. Dr. Lane emphasized that the budget request reflected a clear prioritization of NSF programs.

On March 16, 1995, the Subcommittee held an oversight hearing on the programs of the United States Fire Administration (USFA) under the Federal Fire Prevention and Control Act of 1974. Witnesses included: Representative Steny Hoyer, co-Chairman, Congressional Fire Caucus; Carrye Brown, Administrator, USFA; Gary Tokle, Assistant Vice President, National Fire Protection Association; Francis McGarry, President, National Association of State Fire Marshals, Bill Jenaway, GIGNA Corporation; and Dan Shaw, Chief of the Placitis, New Mexico Fire Department. All witnesses testified to the success and importance of the United States Fire Administration.

On October 24, 1995, the Subcommittee held an oversight hearing on the National Earthquake Hazards Reduction Program (NEHRP). Witnesses included: Dr. Paul Komor, former project director and author of the report, "Reducing Earthquake Losses," is-

sued by the Office of Technology Assessment (OTA); Dr. Daniel Abrams, Professor of Civil Engineering at the University of Illinois; Richard Moore, Associate Director for Mitigation for the Federal Emergency Management Agency (FEMA); Dr. Robert Hamilton, Program Coordinator for Geological Hazards for the United States Geological Survey (USGS); Dr. Joseph Bordogna, Assistant Director for Engineering for the NSF; Dr. Richard Wright, Director of the Building and Fire Research Laboratory for the National Institute of Standards and Technology (NIST); Dr. Paul Somerville, Seismologist at Woodward-Clyde Federal Services; Dr. Thomas Jordan, Professor of Earth Science at the Massachusetts Institute of Technology; Dr. Thomas Anderson, Fluor Daniel; and Dr. Anne Kiremidjian, Professor of Civil Engineering at Stanford University. The witnesses were unanimous in their support for the NEHRP and all urged the Committee to reauthorize the program.

Subcommittee on Energy and Environment

On October 17, 1995, the Subcommittee on Energy and Environment held a hearing titled, "Next Generation Weather Radar (NEXRAD): Are We Covered?," to examine the National Weather Service's (NWS) current plan for modernization focusing on NEXRAD coverage for the United States. Witnesses included: Representatives Steve Buyer; Phil English; George Gekas; Mark Souder; Wally Herger, and Mac Thornberry; Mr. Joe Friday, Jr., Assistant Administrator for Weather Services at the National Oceanic and Atmospheric Administration (NOAA); Dr. William E. Gordon, Chairman of the NEXRAD Panel, and Floyd Hauth, Study Director for the Committee on the Modernization of the NWS; and, Jack L. Brock, Jr., Director of the Defense Information and Financial Management Systems for the Accounting and Information Management Division of the United States General Accounting Office (GAO). Witnesses commented on recommendations made by the NEXRAD Panel and the National Research Council (NRC).

On February 29, 1996, the Subcommittee held a hearing titled, "National Weather Service Modernization Program Status." The focus of the hearing was on the GAO and Department of Commerce Inspector General (IG) reports which raised concern about the lack of quality assurance and the unrealistic timetable associated with the cornerstone of the NWS modernization program, the Advanced Weather Prediction System (AWIPS). Witnesses included: the Honorable Dr. D. James Baker, Administrator of NOAA and Under Secretary for Oceans and Atmosphere, Department of Commerce; Mr. Frank DeGeorge, Inspector General, U.S. Department of Commerce; Mr. Arthur Zygielbaum, Senior Member of the Technical Staff in the Observational Systems Division, Jet Propulsion Laboratory, California Institute of Technology; and Mr. Jack L. Brock, Jr., Director of Information Resources Management/Resources Community and Economic Development, GAO. According the panel, the NWS believes that a minimal amount of risk is associated with the aggressive deployment schedule, but acknowledges that there is some technical risk of schedule slip due to the overlap of certain development steps.

On March 21, 1996, the Subcommittee held a hearing titled, "Budget Hearing on FY 1997 Request of DOE, NOAA, EPA and

Safe Drinking Water R&D." Testimony was received from the Honorable Dr. D. James Baker, Administrator of NOAA and Under Secretary of Oceans and Atmosphere, U.S. Department of Commerce on the Administration's FY 1997 budget request for NOAA. Dr. Baker testified that NOAA's budget request increase is primarily driven by systems costs. Testifying on behalf of the Administration's FY 1997 budget request for the Environmental Protection Agency (EPA) was the Honorable Dr. Robert J. Huggett, Assistant Administrator for Research and Development, EPA. Dr. Huggett testified on the reorganizations that have been taking place within EPA and the areas of primary concern for the Office of Research and Development.

Subcommittee on Space and Aeronautics

The Subcommittee on Space and Aeronautics held two formal authorization hearings on the Administration's Fiscal Year 1997 budget request. On March 28, 1996, NASA Administrator Daniel S. Goldin testified about the agency's programs. Mr. Goldin said NASA asked for stable funding through Fiscal Year 1997 and that the President's budget for Fiscal Year 1997 was essentially the same level as Fiscal Year 1996, $13.8 billion. He noted, however, that he was not ready to accept the outyear numbers in the proposed budget.

On April 17, 1996, the Subcommittee held a hearing on the Fiscal Year 1997 NASA Authorization. The hearing consisted of six panels of witnesses with detailed testimony regarding various NASA enterprises including: (1) zero base review; (2) space technology; (3) space science; (4) aeronautics; (5) human exploration and development of space; (6) and outreach and education. Witnesses included: Mr. Richard Wisniewski, Deputy Associate Administrator for the Office of Space Flight, NASA; Dr. Anthony England, Space Studies Board, National Research Council; Dr. W.D. Kay, Associate Professor for the Department of Political Science at Northeastern University; Col. Gary Payton, Director of the Space Transportation Division, NASA; Maj. Gen. Lance Lord, Director of Plans, Air Force Space Command; Mr. Rick Fleeter, President of AeroAstro; Mr. Ray Morgan, Vice President for Aerovironment; Mr. Louis J. Lanzerotti, Distinguished Member Technical Staff of Lucent Technologies; Dr. John Hester, Assistant Professor of Physics and Astronomy, Arizona State University; Dr. Holland Ford, Department of Physics and Astronomy, Johns Hopkins University; Dr. Anneila Sargent, Chair of the Department of Astronomy, California Institute of Technology and Chair of the NASA Space Science Advisory Committee; Dr. Louis Friedman, Executive Director for The Planetary Society; Dr. Jerry Grey, American Institute of Aeronautics and Astronautics; Col. Michael S. Francis, Tactical Technology Office, Defense Advanced Research Projects Agency; Dr. Fred Billig, Applied Physics Lab, Johns Hopkins University; Mr. Wilbur C. Trafton, Associate Administrator for the Office of Space Flight, NASA; Mr. Kent Black, Chief Executive Officer, United Space Alliance; Mr. Dan Tam, Space Station Business Manager, NASA; VADM Robert F. Dunn, Aerospace Safety and Advisory Panel; Mr. Jim Pagliasotti, Executive Director, Aerospace States

Association; and, Dr. Joel Snow, Director for the Institute for Physical Research & Technology, Iowa State University.

Subcommittee on Technology

On April 16, 1996, the Subcommittee on Technology held a hearing on the Fiscal Year 1997 budget request for the Technology Administration (TA) and the National Institute of Standards and Technology (NIST). Testimony was received from Dr. Arati Prabhakar, Director of NIST, who was accompanied by Mr. Gary Buchula, Deputy Undersecretary of the TA. Dr. Prabhakar testified in favor of the FY97 budget request.

On May 16, 1995, the Subcommittee held an oversight hearing to examine the Federal Aviation Administration's (FAA) research and acquisition management. Witnesses included: Dr. Gerald L. Dillingham; Associate Director, Transportation and Telecommunications issues, GAO; Mr. Kevin P. Dopart, Senior Analyst, Energy, Transportation and Infrastructure Program, Office of Technology Assessment (OTA); and, Dr. George L. Donohue, Associate Administrator for Research and Acquisition, FAA. Witnesses discussed FAA's problems in developing and deploying systems in the R&D area, bridging cultural gaps, and transforming its acquisition process.

On December 7, 1995, the Subcommittee held a second oversight hearing regarding the FAA's acquisition management. Witnesses included: Dr. John J. Fearnsides, Senior Vice President and General Manager, MITRE Corporation; Mr. Robert J. Stevens, Loral Federal Systems; Mr. J. Roger Fleming, Senior Vice President, Air Transport Association; Mr. Sigbert B. Poritzky, former member of the FAA R&D Advisory Committee; Dr. Robert E. Whitehead, Office of Aeronautics, NASA; Dr. Alan R. Thomas, NOAA; and, Mr. William "Bud" Laynor, National Transportation Safety Board. According to testimony, major issues are FAA's long-standing internal management problems and cultural impediments to improving the acquisition process.

On April 18, 1996, the Subcommittee held a hearing to receive testimony regarding the President's FY 1997 budget request for FAA Research, Engineering and Development (R,E&D), and to review the management reform initiatives directed toward improving FAA's R,E&D activities. Witnesses included: the Honorable David R. Hinson, Administrator, FAA; and Dr. George L. Donohue, Associate Administrator for Research and Acquisitions, FAA. Witnesses testified that management and organizational changes made over the past year, combined with the new acquisitions management system that went into effect on April 1st, fully address the Committee's concerns.

The Full Committee met to mark up a Committee print on April 24, 1996. After adopting five amendments, a quorum being present, the Full Committee approved the Committee print, as amended, by a recorded vote of Yeas—24 to Nays—19, and ordered it reported. A motion was then adopted to prepare a clean bill for introduction in the House, and that the measure be deemed reported by the Committee. The Committee filed House Report 104-550, Part I, on May 1, 1996. On May 6, 1996, the Committees on Resources,

Transportation and Infrastructure, and National Security discharged H.R. 3322 from further consideration.

On May 7, 1996, the Committee on Rules granted an open rule, adopting H. Res. 427. On May 9, 1996, the House passed the rule. H.R. 3322 was called up by the House under an open rule on May 29, 1996, with the Committee Amendment in the Nature of a Substitute considered as an original bill for the purpose of amendment. It was considered on May 29 and 30, 1996, and passed the House, with amendments, by voice vote, on May 30, 1996. H.R. 3322 was received in the Senate on June 3, 1996, and referred to the Senate Committee on Commerce, Science and Transportation. The Senate took no formal action on this legislation.

2.15—SPACE COMMERCIALIZATION PROMOTION ACT OF 1996 (H.R. 3936)

Background and summary of legislation

In 1994, commercial space activity in the United States generated $6.2 billion in revenue. Current estimates indicate that this area of activity generated revenue of some $7.5 billion in 1995. For most of this decade, commercial space activity has proven recession-proof, providing thousands of high-skilled, well-paying jobs in the nation's aerospace industry, which has borne the burden of cutbacks in federal defense spending since 1986. Besides improving the U.S. industrial base, commercial space business creates new capabilities for using space to enhance the lives of millions of Americans and provides tax revenue that will help balance the federal budget.

Commercial space activity has received bipartisan support for years, resulting in the passage of landmark legislation, such as the Commercial Space Launch Act of 1984, the Launch Services Purchase Act of 1990, and the Land Remote Sensing Policy Act of 1992. While those laws have enabled the U.S. commercial space industry to lead the world in the private development of space, experience and the pace of technological change have demonstrated that the regulatory framework governing commercial space activity needs to be updated and improved. The Space Commercialization Promotion Act of 1996 begins this process.

The purpose of the bill is to encourage the development of a commercial space industry in the United States by streamlining government regulatory procedures and unleashing the creativity and industry of American entrepreneurialism.

Legislative history

On March 5, 1996, the Science Committee introduced a new concept for legislative information gathering and held a roundtable on a draft bill entitled, "Omnibus Space Commercialization Act of 1996," and on H.R. 1953, the "Space Business Incentives Act of 1996." The roundtable, co-sponsored by a Washington-based grassroots space advocacy group, the National Space Society, welcomed current and former government officials; industry executives from small, entrepreneurial companies and larger government contractors; policy analysts from various think tanks; and representatives from advocacy groups. Because the forum was unofficial and not highly structured, participants were free to speak more candidly

than hearings usually allow. Based on that roundtable and additional comments from other interested parties, the Omnibus Space Commercialization Bill was redrafted, streamlined, renamed the "Space Commercialization Promotion Act of 1996," and introduced by twelve members of the Science Committee on August 1, 1996.

In addition to the roundtable, the Committee held several hearings on commercial space development that were instrumental in developing and finalizing the legislation. On November 8, 1995, the Science Committee held a hearing entitled, "NASA Procurement in the Earth-Space Economy," which examined methods by which NASA could fulfill its missions while stimulating the commercial space industry. Witnesses included: Ms. Deirdre Lee, NASA's Associate Administrator for Procurement; Mr. Rick Dunn, who served in the office of NASA's General Counsel and is currently General Counsel of the Defense Advanced Research Projects Agency; Mr. John Muratore, of the Johnson Space Center; Mr. Dennis Burnett, representing Instrumentation Technology Associates, Inc.; Mr. David Rossi, Senior Vice President of Spacehab, Inc.; Mr. James Frelk, Vice President of Earthwatch Inc.; and Mr. Tom Rogers, President of the Sophron Foundation and President of the Space Transportation Association.

On June 12, 1996, the Subcommittee on Space and Aeronautics held a hearing, "U.S. Space Launch Strategy," which examined the health of the U.S. space launch industry and the impact of various trade agreements. Witnesses included: the Honorable Dan Goldin, NASA Administrator; Mr. Robert Davis, Deputy Undersecretary of Defense for Space; Mr. Don Eiss, Deputy Assistant U.S. Trade Representative for Industry and Labor; Ms. Catherine Novelli, Deputy Assistant U.S. Trade Representative for Eastern/Central Europe and Eurasia; Mr. Frank Weaver, FAA Associate Administrator for Commercial Space Transportation; Dr. Brian Dailey, Vice President for Business Development of Lockheed Martin Corporation's Space and Strategic Missiles Sector; Mr. Stanley Ebner, Senior Vice President for Washington Operations of McDonnell Douglas Aerospace; Mr. Edward O'Connor, Executive Director of the Spaceport Florida Authority; Mr. Pat Ladner, Executive Director of the Alaska Aerospace Development Corporation; Mr. Donald Smith, Executive Director of the Western Commercial Space Center; and Mr. David Montanaro, Vice President of Teledesic Corporation. Written statements were accepted from Rockwell International Corporation and Arianespace.

On July 31, 1996, the Subcommittee on Space and Aeronautics held a hearing on the draft legislation entitled "The Space Commercialization Promotion Act of 1996." Witnesses included: the Honorable Lionel S. Johns, Associate Director for Technology of the White House Office of Science and Technology Policy; Lt. Gen. Spence Armstrong (retired), NASA Associate Administrator for Human Resources and Education; Mr. Gil Klinger, Principal Assistant Undersecretary of Defense for Space; Dr. Brian Dailey, Vice President for Business Development of Lockheed Martin Corporation's Space and Strategic Missiles Sector; Dr. Scott Pace, the RAND Corporation; and Mr. Mark Brender, of ABC News, representing the National Radio and Television News Director's Association's Remote Sensing Task Force. The record was held open

after the hearing to accept additional written statements from interested parties. The Subcommittee received statements from the U.S. GPS Industry Council, the United Space Alliance, the North American Remote Sensing Industries Association, and the law firm of Reed Smith Shaw & McClay.

H.R. 3936 was introduced August 1, 1996, by Chairman Robert S. Walker and co-sponsored by Mr. Sensenbrenner, Mr. Largent, Mr. Weldon of Florida, Mr. Rohrabacher, Mr. Hilleary, Mr. Stockman, Mr. Davis, Mr. Calvert, Mr. Baker of California, Mrs. Seastrand, and Mr. Tiahrt. The bill was referred to the Committee on Science and the Committee on Government Reform and Oversight. Within the Science Committee, the bill was referred to the Subcommittee on Space and Aeronautics. On September 9, 1996, Chairman Sensenbrenner and Ranking Member Hall signed a letter of discharge, releasing the bill from the Subcommittee on Space and Aeronautics to the Committee on Science for consideration.

On September 11, 1996, the Committee on Science marked up H.R. 3936. A quorum being present, the bill was adopted, as amended, by a voice vote and ordered reported (H. Rept. 104-801, Part I), by a voice vote, to the full House for consideration. One amendment, a manager's amendment jointly sponsored by Chairman Walker and Ranking Member Brown was adopted by a voice vote. The Committee also adopted by a voice vote motions to submit supplementary, Minority, or additional views for the legislative report.

Science Committee staff met with representatives of the Committee on Government Reform and Oversight, whose concerns were, for the most part, addressed in the manager's amendment during the Science Committee markup of the bill. On September 16, 1996, Chairman William F. Clinger Jr., signed a letter of discharge from the Committee on Government Reform and Oversight, releasing the bill for consideration by the House of Representatives. On September 17, 1996, H.R. 3936 was placed on the Union Calendar and called up by the House under suspension of the rules with an amendment (the amendment struck all language after the enacting clause and inserted new text). The amendment was intended to resolve outstanding issues that were raised in the Full Committee markup. H.R. 3936 passed the House by a voice vote on September 17, 1996. On September 18, 1996, H.R. 3936 was received in the Senate. The Senate took no formal action on this legislation.

CHAPTER III—OTHER MEASURES DISCHARGED BY THE COMMITTEE ON SCIENCE

3.1—PROPANE EDUCATION AND RESEARCH ACT OF 1995 (H.R. 1514/P.L. 104-284)

Background and summary of legislation

H.R. 1514, the Propane Education and Research Act of 1995, was introduced on April 7, 1995, by Mr. Tauzin (R-LA). It was referred to the Committee on Commerce, and in addition to the Committee on Science. The measure was referred to the Subcommittee on Energy and Environment on April 13, 1995.

On April 16, 1996, the Committee on Commerce held a markup and ordered H.R. 1514 reported, as amended, by a voice vote. The Committee on Commerce filed H.Rept. 104-655, Part I, on July 8, 1996, and the Committee on Science received referral of the measure on that date. On July 10, 1996, the Committee on Science discharged the measure. The House voted to suspend the rules and pass H.R. 1514, as amended, on September 4, 1996.

The Senate passed H.R. 1514 on September 28, 1996, clearing the measure for the President. On October 11, 1996, the President signed H.R. 1514, the Propane Education and Research Act of 1995, which became Public Law 104-284.

3.2—WATER DESALINATION ACT OF 1996 (S. 811/P.L. 104-298)

Background and summary of legislation

The Water Desalination Act of 1996, S. 811, was introduced on May 17, 1995, by Senator Simon (D-IL) and was referred to the Senate Committee on Environment and Public Works. On March 28, 1996, the Senate Committee on Environment and Public Works held a markup and ordered the measure reported, as amended, by a voice vote, and filed S. Rept. 104-254 on April 18, 1996. On May 3, 1996, the Senate passed S. 811 by a voice vote after agreeing to a Committee Amendment in the Nature of a Substitute. It was received in the House and held at the desk on May 6, 1996.

On May 14, 1996, S. 811 was referred to the House Committee on Resources and in addition to the Committees on Science and Transportation and Infrastructure. The Committee on Science referred the measure to the Subcommittee on Energy and Environment on May 20, 1996.

The Committee on Resources held a markup on August 1, 1996, and ordered S. 811 reported, as amended, by a voice vote and filed H.Rept. 104-790, Part I, on September 16, 1996. The Committees on Science and Transportation and Infrastructure discharged S. 811 on September 16, 1996, and on September 24, 1996, the House voted to suspend the rules and pass the measure, as amended.

On September 27, 1996, the Senate concurred in the amendments of the House to S. 811 clearing the measure for the President. On October 11, 1996, the President signed S. 811, the Water Desalination Act of 1996, which became P.L. 104-298.

CHAPTER IV—OVERSIGHT, INVESTIGATIONS AND OTHER ACTIVITIES OF THE COMMITTEE ON SCIENCE, INCLUDING SELECTED SUBCOMMITTEE LEGISLATIVE ACTIVITIES

4.1 COMMITTEE ON SCIENCE

4.1(a)—Is Today's Science Policy Preparing Us For the Future?

January 6, 1995

Hearing Volume No. 104-1

Background

On January 6, 1995, the Committee on Science held a hearing entitled, "Is Today's Science Policy Preparing Us for the Future?" This first hearing of the 104th Congress was aimed at hearing from the heads of the departments and agencies under the Committee's jurisdiction. Witnesses were asked to focus on the long-term and to explain how today's policies are taking their respective departments into the future.

The hearing consisted of one panel of witnesses including: the Honorable Ronald H. Brown, Secretary of Commerce; the Honorable Daniel S. Goldin, NASA Administrator; the Honorable Neal F. Lane, Director of the National Science Foundation; the Honorable Carol Browner, Administrator of the Environmental Protection Agency; and the Honorable Jack Gibbons, Director, Office of Science and Technology Policy.

The Honorable Hazel O'Leary, Secretary of Energy, and the Honorable Federico Pena, Secretary of Transportation, submitted written statements for the record.

Summary of Hearing

Secretary Brown spoke of the importance of the private sector in generating economic growth and cited actions of the Administration in working for job creation, worker training and export promotion. He expressed strong support for industry-government partnerships and the Commerce Department's technology programs, such as the Advanced Technology Program and the Manufacturing Extension Program.

Mr. Goldin discussed NASA's budget reductions and the agency's plans to privatize and commercialize infrastructure and operations, thereby freeing up resources to concentrate on "revolutionary R&D." He spoke of the technologies that will be needed in 2015: faster computers, robots, microelectronics, and advances in biotechnology. He believes that within 20 years, we will have a new space transportation system, access to space at a lower cost, faster airplanes, and experimental spacecraft.

Ms. Browner spoke in strong support of additional environmental research and expressed cautious support for limited risk assessment legislation.

Dr. Lane stressed that science and fundamental engineering "is the future." He discussed the National Science Foundation's strategic plan and its three goals for science: world leadership, scientific knowledge, and service to promote a technologically literate society.

Dr. Gibbons summarized the Administration's science and technology initiatives and outlined what he believes is the Federal Government's role in advancing technology: ensuring a strong base of fundamental science; providing a business environment that encourages innovation; and investing in research that cannot attract adequate private support.

4.1(b)—Restructuring of the Federal Scientific Establishment

June 28, 1995

Hearing Volume No. 104-14

Background:

On June 28, 1995, the Committee on Science held a hearing entitled, "Restructuring of the Federal Scientific Establishment." The purpose of this hearing was to receive testimony from outside witnesses on restructuring the federal scientific establishment to include creating a Department of Science in order to house various science elements of the Federal Government. A proposal by Chairman Walker would combine the science programs of the existing Commerce and Energy Departments, along with NASA, NSF, EPA, the Patent and Trademark Office, and the United States Geological Survey. Advocates believe that science would benefit from having a cabinet-ranking science secretary, from a budget allocation dedicated to science and from administrative savings. Opponents argue U.S. science has benefited from the current plurality of funding sources.

The hearing consisted of one panel of witnesses, including: the Honorable George A. Keyworth, Chairman, The Progress and Freedom Foundation; the Honorable Don Ritter, Chairman, National Environmental Policy Forum; the Honorable Henson Moore, President & CEO, The American Forest and Paper Association; and Dr. Joseph Spigai, Director, Engineering Management Program, The University of Maryland.

Summary of Hearing

George A. Keyworth, a former White House science advisor for President Reagan, testified in support of a proposal by Chairman Walker for a Department of Science. He said that all nations have some form of science ministry at a cabinet level, and having a Department of Science would enhance American competitiveness and foundations internationally. He also said the science community has lost the American people's trust and we have to earn it back by refocusing science on excellence and reemphasizing basic research. Dr. Keyworth told the Committee that federally funded science today caters to spoiled scientists who spend half their time

trying to win new grants instead of doing research or teaching. He said that the kind of restructuring implicit in the proposal for a Department of Science is the only way to restore coherent policies, research dedicated to excellence, and the public's trust.

Don Ritter, a former Member of Congress, testified that science has not lived up to its potential to enhance the performance of a $6 trillion economy. He said a new department could give a higher profile to science and scientists and bring greater significance and influence of science to the national debate. He also said that it is possible that a Science Department could mean less politicization of science because of stronger priority setting. Mr. Ritter emphasized greater separation between science and the regulatory process. He said that scientific R&D has become too big and has developed its own momentum, and that change is necessary for those who have become dependent on federal funds.

W. Henson Moore, former Deputy Energy Secretary under President Bush, testified that science is vital to our future and the Federal Government should be involved. However there are limited resources and science cannot afford a lack of direction, duplication or priorities being set for reasons other than the best interests of the nation. Mr. Moore tried to restructure the Department of Energy to combine a variety of science programs but ran into "a buzz saw" of complaints from people with special interests. He said some in Congress and in federal departments opposed it because they would lose some power and control, and researchers feared the reorganization because they thought they would lose federal grants. During his consideration of this concept Mr. Moore observed that we do not have a clear science spokesman and we are not satisfied with the visibility or emphasis our society places on science. Mr. Moore suggested a centralization of the Department of Energy's science programs and the possibility of a department of energy, science and technology.

Dr. Joseph Spigai, director of the University of Maryland Graduate School of Management and Technology, testified that the nation needs a combined science policy and funding effort. Dr. Spigai endorsed the efforts of Chairman Walker's proposal to create a Department of Science and said the science community needs to speak with one voice rather than many. He also said we needed to be cautious in the organization of a new department. Dr. Spigai said the new department must be organized logically, that the infrastructure be in place to provide the Secretary of Science with nonpartisan objective science policy advice and that regulatory policy and research policy remain separate objectives. Dr. Spigai has a more expansive proposal which would create a department of science and technology. Along with the agencies in Chairman Walker's proposal, Dr. Spigai's proposal would include medical research from such agencies as NIH. This proposal is part of a larger effort on behalf of Dr. Spigai who eventually would like to streamline the entire Executive Branch from fourteen agencies to nine which would include Departments of: Commerce, Industry and Economic Development; Defense; Health, Education and Social Welfare; International Relations; Justice; Natural Resources; Science and Technology; Transportation and Communication; and Treasury.

4.1(c)—Educational Technology in the 21st Century—Joint Hearing with the Economic and Educational Opportunities Committee

October 12, 1995

Hearing Volume No. 104-23

Background

On October 12, 1995, the Committee on Science and the Committee on Economic and Educational Opportunities held a joint hearing entitled, "Educational Technology in the 21st Century," to receive testimony on the use of educational technologies to support the educational system over the next twenty years.

The hearing was structured into three panels. The first panel, which represented a futurists perspective, consisted of: Professor Seymour Papert, LEGO Professor of Learning Research, Massachusetts Institute of Technology, Cambridge, MA; Dr. Alan C. Kay, Apple Fellow Learning Concepts, Apple Computer, Los Angeles, CA; Professor Chris Dede, Information Technology and Education, Graduate School of Education, George Mason University, Fairfax, VA; Dr. David E. Shaw, D.E. Shaw & Co., New York, NY.

The second panel, which addressed industry's concerns, consisted of: Mr. Ed McCracken, Chairman and CEO, Silicon Graphics, Mountain View, CA; Mr. Pat Wright, Vice President, TCI Educational Technologies, Inc., Englewood, CO; Mr. Robert W. Mendenhall, Vice President and General Manager, K-12 Industry Division, IBM, Atlanta, GA; Mr. Jeff Joseph, Vice President Domestic Policy, U.S. Chamber of Commerce, Washington, DC.

The third panel, which represented the education community, consisted of: Dr. Deborah McGriff, Senior Vice President, Public School Partnership, Edison Project, New York, NY; Ms. Cheryl L. Lemke, Associate Superintendent, Learning Technologies, Illinois State Board of Education, Springfield, IL; and Dr. Alan S. Brown, Superintendent of Waukegan Public Schools District 60, Waukegan, IL.

Summary of hearing

Panel 1: Futurists Perspective

Professor Seymour Papert, LEGO Professor of Learning Research, Massachusetts Institute of Technology doubts that we will see classrooms as we know them today in the future. Professor Papert envisions children learning in an environment radically different from today's classroom.

Dr. Alan Kay, Apple Fellow Learning Concepts, Apple Computer, agreed with Professor Papert's vision of how education and computer technology will play itself out. He commented that we need to do more than to simply try to deal with vocational problems and institute training via computers in schools. He feels there is very little chance of change because of the "enormous situated bureaucracy for running education in this country."

Professor Chris Dede, Information Technology and Education, Graduate School of Education, George Mason University, stated that High Performance Computing and Communications (HPCC) will enable K-12 schools to move toward collaborative learning

through doing, known as distributed learning. He believes virtual communities will encourage and motivate learners. He outlined three reasons educational technology has made a limited impact to date: (1) models of presentational teaching have been implemented, rather than learning by doing; (2) teaching has been isolated in school settings, rather than empowering learning in homes, communities, work places and via the media; and (3) teachers and school administrators do not have a support system in place to reconceptualize their roles.

Dr. David E. Shaw, D.E. Shaw & Co., stated that we can expect to see dramatic increases in computer power, speed and memory. Furthermore, personal computers will become much more affordable, enabling interactive communications including full motion video with high quality audio to become common. Dr. Shaw foresees the role of the teacher to transform into that of a coach, a monitor, helping students in a different way. Also, he believes it will be necessary to involve parents, the community, and the technology, particularly to the extent that we have access in the home.

Panel 2: Industry Perspective

Mr. Ed McCracken, Chairman and Chief Executive Officer of Silicon Graphics, spoke of five points to prepare us for the 21st Century: (1) we need to prepare our children for the information age; (2) we need a national initiative; (3) the technologies must be affordable and accessible; (4) teacher training is essential and the current programs need to be revamped; and (5) local community leadership can make a difference.

Mr. Pat Wright, Vice President, TCI Educational Technologies, Inc., spoke of the Sparkman Center and the Showcase Schools program which were created to begin the transformation of our education system.

Mr. Robert W. Mendenhall, Vice President and General Manager, K-12 Industry Division, IBM, made four recommendations: (1) direct funding towards technology; (2) match infrastructure funds with funds for applications and training; (3) tie funding to actual outcomes; and (4) we need to provide affordable access in schools and libraries.

Mr. Jeffrey Joseph, Vice President Domestic Policy, U.S. Chamber of Commerce, spoke of the need for a collaborative effort between federal, state and local leaders working together towards a common goal to make things work.

Panel 3: Education Perspective

Dr. Deborah McGriff, Senior Vice President, The Edison Project, spoke of life-long learning devices which could be used any place, any time, anywhere.

Ms. Cheryl L. Lemke, Associate Superintendent, Illinois State Board of Education, discussed empowering children to influence public policy, making education student-centered, providing access, finding education pioneers within communities and honoring them, providing incentives, and the critical role of infrastructure.

Dr. Alan S. Brown, Superintendent of Schools, Waukegan Community Unit District No. 60, explained a school system without age grouping, students teaching each other. In addition, he rec-

ommended a National Technical Advisory Council (NATC) to recommend objectives for districts and educators and suggested pilot demonstration programs. Dr. Brown expressed the need for the Federal Government to provide guidance and incentives, not mandates.

4.1(d)—U.S./Japanese Cooperation in Human Spaceflight

October 19, 1995

Hearing Volume No. 104-22

Background

On October 19, 1995, the Committee on Science held a hearing entitled, "U.S./Japanese Cooperation in Human Spaceflight." 1995 marked the 50th anniversary of the end of World War II. Nowhere has the emerging interdependence of U.S./Japanese interests been more evident than in space exploration. Japan has been one of the most active nations in conducting cooperative missions with the United States. We have formed partnerships in the areas of space science, space applications, human spaceflight, and the International Space Station Alpha, where Japan has pledged over $2 billion for its contribution, the Japanese Experimental Module (JEM). The first Japanese Shuttle mission was flown in September 1992 with a crew that included Mamoru Mori. A second mission was flown in 1994 with Dr. Chiaki Mukai, the first Japanese woman to fly in space. Japan's space budget has been growing at a rate of between 7-9% per year for the past several years, while the space budgets for most potential international partners has been declining.

One panel of witnesses represented the views of both Japan and the Administration with respect to U.S./Japanese cooperative efforts in space and consisted of: Ambassador Takakazu Kuriyama; Mr. Takashi Matsui, President of the National Space Development Agency of Japan (NASDA); Dr. Chiaki Mukai, astronaut; and Mr. Daniel S. Goldin, NASA Administrator.

Summary of hearing

Mr. Matsui noted that the Space Station has evolved into a truly international venture and that the Japanese component (JEM) is the largest investment in the history of Japanese space development. He also noted the many successes as a result of cooperative activities in the areas of microgravity experiments and earth observation. He concluded by stating that international cooperation has become an essential factor for many science and technology projects and future space development activities in particular, and that it will be NASDA's policy to be active in future international projects.

Ambassador Kuriyama noted that U.S./Japanese cooperation in the area of science and technology is a major pillar of our partnership and that Japan has benefited greatly from this postwar cooperation. He expanded further to say that in recent years this cooperation has matured into a mutually beneficial, two-way relationship, with space demonstrating the highly positive development of our cooperative ties.

Dr. Mukai noted that the U.S. Congress is one of the most important venues affecting global science and technological progress. She said further that space collaboration is one of the fruits of post-war cooperation. She spoke about the importance of zero gravity in scientific studies, especially those dealing with osteoporosis. She concluded by outlining four aspects of how the manned space program is understood in Japan today: (1) science and technology are integral driving forces for Japan to realize national development complementing its limited natural resources and space development. Advanced R&D, in particular, will be essential for the future of Japan; (2) international cooperation is essential for Japan in order to realize a manned space program; (3) the manned space program contributes to education; and (4) the space program makes us aware that this planet is the only place for humans to live and that we must cooperate with each other to share and protect it. She concluded by stating her hopes that the United States and Japan will continue to cooperate in order to advance global science and technology and for the betterment of human welfare into the 21st Century.

NASA Administrator Daniel Goldin emphasized that Japan was a committed and trusted partner, and that this partnership has been tremendously beneficial to the United States. He said we have learned valuable lessons from Japan's expertise and quality. He noted further that Japan is one of our most steadfast partners in the International Space Station Alpha program (ISSA), and that its contribution to the ISSA, JEM, has not once been altered from its original commitment.

4.1(e)—NASA Purchasing in the Earth-Space Economy

November 8, 1995

Hearing Volume No. 104-33

Background

On November 8, 1995, the Committee on Science held a hearing entitled, "NASA Purchasing in the Earth-Space Economy." This hearing explored various options NASA could take advantage of to acquire advanced technology coupled with cost savings, which under current practices are difficult to attain. NASA rarely uses market practices to acquire space hardware, technology, or services from the private sector to fulfill its mission needs. It normally purchases entire missions under cost-type contracts (NASA pays all the direct costs incurred by a company in performing to contract specifications, plus a fee, usually a fixed percent of the contractor's direct costs). These cost-type contracts are entered into with predominately large aerospace companies expert at dealing with the U.S. government and its complex procurement regulations. Therefore, NASA is not in the habit of availing itself of space hardware, technology, or services from outside this "family" of aerospace contractors. This practice not only does not serve to broaden the industrial base to the extent possible, it also results in a dependency on a shrinking base of suppliers for the things it needs. With true international commitment to the International Space Station Alpha

(ISSA) even more secure as a result of the Toulouse, France meeting of the European Space Agency (ESA), ISSA not only holds the promise of a genuine international cooperative effort but, also, the promise of opening the "final frontier" to a truly commercial venture. This can only be accomplished if NASA changes its "culture" with respect to procurement practices.

One panel of witnesses represented the views of both industry and the Administration and consisted of: Mr. Dennis Burnett, Counsel, Instrument Technology Associates, Inc.; Mr. Tom Rogers, Chairman, Board of Advisors, Space Frontier Foundation; Mr. James Frelk, Vice President, Earthwatch, Inc.; Mr. David Rossi, Vice President, Spacehab, Inc.; Mr. Richard Dunn, General Counsel, Advanced Research Projects Agency; Mr. John Muratore, Project Manager, Lyndon B. Johnson Space Center; and Ms. Deirdre Lee, Associate Administrator for Procurement, National Aeronautics and Space Administration.

Summary of hearing

Ms. Deirdre Lee said NASA recognizes the need for significant improvement in procurement practices and procedures. She stated that in order for NASA to fully invoke the talents of the commercial world, it has to continue implementing two fundamental changes: (1) Improve the definition of NASA needs in results-oriented rather than process-oriented terms; and (2) change NASA management and oversight structure to compliment the industry role. While Ms. Lee discussed the four basic tenants of government procurement, her overriding argument was that NASA does things "different" from the way a consumer would buy something. Although Ms. Lee noted that NASA management practices must change and that NASA must work more effectively with industry, she did not provide a concrete NASA plan to change the process.

Mr. Richard Dunn noted that it is hard for the government to get past cold war practices when it comes to support of science and technology, and that it needs to radically reform the way it develops R&D to respond to the new realities. He stated that ARPA has statutory authority to enter into non-procurement purchases through the NASA Space Act of 1958. These "other transactions" allow ARPA to step out of the procurement arena and into commercial practices, allowing for greater flexibility. All "other transactions" are cost shared which, he said, is the rationale for getting out of traditional methods.

Mr. John Muratore stated that by using commercial off-the-shelf technology for the new Mission Control Center (MCC), costs have been significantly reduced (NASA has cut the contractual paper work by 75%). He stated further that the new MCC should be able to operate both the control center operations for the Space Shuttle and the Space Station in 1998 for 2/3 of the yearly costs that it took to operate the old MCC for the Space Shuttle alone in 1993. He said NASA needs to become a "smart buyer" (understand requirements before purchasing). The goal is to be able to buy and use technology right out of the box without altering it. With respect to MCC, Mr. Muratore acknowledged during questioning that there was a reluctance on behalf of NASA to do things a whole new way, which he accounts to the "accountability factor," but that they real-

ize there is a challenge to change to fully realize the dreams of space.

Mr. Dennis James Burnet explained a previous barter agreement between ITA and NASA. The arrangement called for ITA to fly its equipment aboard the shuttle, at no cost to ITA, while retaining 50% of its equipment for use by NASA. He noted that this arrangement proved very successful, but that NASA has balked at any new flight agreements. He said NASA wants to build functions ITA has already developed. He concluded that NASA needs incentives to foster commercial space and to leverage commercial space to achieve additional fiscal and scientific benefits.

Mr. David Rossi stated that commercialization can be promoted by focusing on the potential for investors to earn returns commensurate with the risks of the space industry. No amount of support will encourage investment if the loss of principal is possible and the potential rate of return is not appropriate. Investments are made based on the rate of return, not on the potential for loss. He said that by modifying NASA procurement practices, not regulations, industry can be encouraged to offer proposals to NASA for commercial space products and services that NASA can lease or purchase as needed rather than develop, own, and operate. He further stated that the fair price for commercially offered products and services can be determined through competition or by comparison with prices paid by other, non-NASA users. If NASA becomes the sole user of a commercial service offered by a single provider, an independent "should-cost" analysis can be conducted contrasting the price to be paid with the cost of providing the desired services in-house at NASA.

Mr. James Frelk said that creative approaches to structuring partnerships between industry and NASA offers advantages to both sectors in fiscally constrained times. Industry would benefit from innovative work done at NASA, and because industry has the resources and capability to incorporate these technologies into their commercial space systems, it allows government to generate maximum benefits with minimal public investment. He mentioned that NASA's Mission to Planet Earth Program offers opportunities for the commercial remote sensing industry and could be used as a test-bed for procurement reform.

Mr. Thomas Rogers stated that there can be no commercialization of space until unit space infrastructure costs are reduced sharply and soon. Another problem he noted is that NASA builds space assets for government use, not for economic use. The Space Station program, he said, should be thought of as playing a vital role over a transitional interval to help move the manned space area from being one of a publicly funded planned economy to one in which competitive, profit-seeking free enterprise activities flourish. This scenario would drop the cost of space-related goods to the point where true commercialization could commence. He said that the International Space Station Alpha should be seen as our first town in space as should be commercialized.

4.1(f)—Allocating Federal Funds for Science and Technology

February 28, 1996

Hearing Volume No. 104-44

Background

On February 28, 1996, the Committee on Science held a hearing entitled, "Allocating Federal Funds for Science and Technology." The National Academy of Sciences in conjunction with the National Academy of Engineering and the Institute of Medicine were asked, at the request of Congress, to study "the criteria that should be used in judging the appropriate allocation of federal funds to research and development activities, the appropriate balance among different types of institutions that conduct such research, and the means of assuring continued objectivity in the allocation process." The National Research Council's Committee on Criteria for Federal Support of Research and Development recently released its report entitled *Allocating Federal Funds for Science and Technology*. For purposes of this study, the Committee focused on the $35- to $40 billion of the $70 billion spent annually on federal R&D in federal research and development on expanding fundamental knowledge and creating new technologies. The Committee termed this the Federal Science and Technology budget (FS&T). The Committee report made 13 recommendations. This hearing was held to examine the report and its recommendations.

The hearing consisted of one panel of witnesses, including: Dr. Frank Press, President Emeritus National Academy of Sciences, Washington, DC; Mr. Richard Mahoney, Chairman and CEO (Retired) MONSANTO, St. Louis, MO; and Dr. Marye Anne Fox, Vice President for Research, University of Texas, Austin, TX.

Summary of hearing

Dr. Frank Press, President Emeritus, National Academy of Sciences, explained that the heart of the report is the proposal for a budget process that provides a unitary view of the FS&T enterprise. In this way, Congress will be able to gauge the overall health of the enterprise, the adequacy of the overall funding, the manner in which it meets the nation's needs, and understand the interrelationships and complexities among the governmental programs. The Committee adopted several principles to assure the FS&T programs maintained their base within the federal departments, and excellence in responding to crisis, national needs and opportunities. Several of the principles mentioned were: (1) trade-offs within the budget; (2) favoring projects and people over institutions to free up resources; (3) use of merit review; (4) urging international cooperation to share costs; and (5) development of commercial technologies. When questioned about the erratic funding for the ATP since 1992, Dr. Press responded that funding for the program has actually increased 10 fold since 1992 and the program needs to be evaluated. He stated that overall the report has been well-received but critics have protested that the FS&T budget would give Congress a target for cost cutting with a unitary and coherent view of the entire en-

terprise. The FS&T budget is the same as the combined FS&T budgets of Germany, France, the UK and Japan.

Dr. Richard Mahoney, Chairman and CEO (Retired), MONSANTO, commented that currently the private sector does not spend an awful lot on research. The universities are the ones to turn to for research. The private sector would begin doing basic research only if it were cut back to an unmanageable level.

Dr. Marye Anne Fox, Vice President for Research, University of Texas, testified regarding the proper relationship between universities and national labs. The Committee's conclusion is that research should favor academic institutions in many cases because of their flexibility and because of the inherent quality control that results from projects and people which are typically supported at universities, and because they directly link research and training to education.

4.1(g)—U.S. Global Change Research Programs: Data Collection and Scientific Priorities

March 6, 1996

Hearing Volume No. 104-49

Background

On March 6, 1996, the Committee on Science held a hearing entitled, "U.S. Global Change Research Programs: Data Collection and Scientific Priorities." The United States Global Change Research Program (USGCRP) was initiated in 1989 to study the earth's environment. Its 1989 budget was $134 million. Today the USGCRP budget is close to $2 billion per year and involves 18 federal departments and agencies. NASA's Mission to Planet Earth (MTPE) is the largest component of the USGCRP and accounts for approximately 70% of the total program budget. The Administration requested $1.34 billion for MTPE in FY96 and it is estimated that this budget could grow to $1.58 billion by FY00. A GAO study entitled *NASA's Earth Observing System: Estimated Funding Requirements* reported that MTPE's core program, the Earth Observing System (EOS), alone will cost taxpayers $33 billion through completion in 2022. Although NASA has indicated it can restructure MTPE after the year 2000, any savings realized from such an effort would not be seen until the 21st Century. This hearing was held to address the scope of the MTPE program, to assess its relationship to similar programs being carried out in other federal departments and agencies, and to review options for fulfilling MTPE.

The hearing was structured in two panels. Witnesses on the first panel, which discussed industry and Administration views, included: Dr. Edward Frieman, Director, Scripps Institution of Oceanography; Dr. Charles Kennel, Associate Administrator, Office of Mission to Planet Earth, NASA; Mr. Brad Hathaway, U.S. General Accounting Office; Mr. Aram Mika, Hughes Aircraft Corporation; Dr. Peter Castruccio, Ecosystems International, Inc.; Dr. Arno Ledebuhr, Lawrence Livermore National Laboratory; and Dr. Eric Christensen, Earthwatch, Inc.

The second panel, which addressed the views of academia, included: Dr. Robert T. Watson, Associate Director, Environment, Office of Science and Technology Policy; Dr. Patrick Michaels, Department of Environmental Science, University of Virginia; Dr. Richard Lindzen, Sloan Professor of Meteorology, Center for Meteorology and Physical Oceanography, MIT; Dr. Robert Balling, Office of Climatology, Arizona State University; Dr. Michael MacCracken, Office of the U.S. Global Change Research Program; Dr. Robert Davis, Department of Environmental Sciences, University of Virginia; and Dr. John Christy, Earth Systems Science Laboratory, University of Alabama at Huntsville.

Summary of Hearing

Dr. Frieman stated that the quality of science of the USGCRP is high, that it is a fundamentally sound program with immense importance to the future of our country, and that the researchers involved are committed to understanding earth's environment while recognizing budget constraints. The problem, he said, is that science doesn't recognize which agency is conducting the research, and that this program requires interagency links which need to be stronger. He stressed that the USGCRP needs to adopt advances in technology to improve performance and lower costs; ensure the program is open to all (acadamia, government and industry); and should seek additional international partners. He mentioned further that a major issue with NASA's MTPE program is the data and information system of EOS, which, he said, needs to be examined and opened to competition and industry.

Mr. Hathaway noted that NASA's research community is small and that if not expanded there could be an imbalance between the number of funded investigations and the magnitude of the potential research opportunities created by data from EOS. He is concerned that scientists will only analyze data they are paid for.

Dr. Kennel stressed that MTPE is a science driven program and can accomplish its fundamental scientific goals and cut out-year costs by 30%.

Mr. Mika had four key messages which can be found in his testimony and he went on to say that MTPE needs to make a broad variety of measurements requiring a wide variety of instruments. Customized small spacecraft will cost money, he said, and recommended medium-sized spacecraft such as the Delta.

Dr. Castruccio noted that science needs to be made affordable and that there are a considerable amount of ground stations that can handle the data being returned from EOS.

Dr. Ledebuhr stressed that using miniaturized technology could reduce the cost of EOS by 75%.

Dr. Christensen applauded the Chairman and the Committee for encouraging the government to purchase from the private sector when possible.

Dr. Watson stated that the Intergovernmental Panel on Climate Change (IPCC) concluded that human activities are increasing greenhouse gases. He noted that the scope of a comprehensive research program should evaluate three questions, which are listed in his testimony. Also listed are IPCC's main conclusions for each of the three questions.

Dr. Michaels centered his testimony on seven examples of how climate data have changed the paradigm on climate change from "dangerous" to "moderate."

Dr. Lindzen emphasized that the fundamental question with respect to the global climate change issue is how much, where, and when did the human race contribute to climate changes?

Dr. Balling centered his remarks around the fact that satellites are showing different results than the climate models with respect to warming trends.

Dr. MacCracken emphasized that an important part of the global climate change issue is the need to understand how climate is changing, for example, the effects of CO2, sulfate aerosols, etc.

Dr. Davis stressed that climate models are not always accurate and sometimes will show the opposite of what is actually occurring. He stated that not all events are attributable to global warming.

Dr. Christy stated that he supports space-based atmospheric research, but noted that while it has been observed that there has been enough change in the global climate to cause concern, this situation should be studied thoroughly before prescribing a definitive course of action.

4.1(h)—Civilian Science Agencies' Implementation of the Government Performance and Results Act

July 10, 1996

Hearing Volume No. 104-73

Background

On July 10, 1996, the Committee on Science held a hearing entitled, "Civilian Science Agencies' Implementation of the Government Performance and Results Act." The Government Performance and Results Act (GPRA) of 1993, P.L. 103-62 enacted on August 3, 1993, encourages greater efficiency, effectiveness, and accountability in federal spending by directing agencies to develop and use performance-based planning, reporting, and budgeting. In particular, it intends to improve program delivery by fundamentally shifting the focus of federal management from inputs, such as staffing and activities levels, to outputs and the outcomes of federal programs. Another purpose of the Act is to enhance Congressional decision making. GPRA requires the development and use of performance assessment and other information for agency management and, ultimately, over a seven-year period, the use of performance assessment for allocating budgets. The law is being implemented initially through 71 pilot projects during Fiscal Years 1994 through 1996 to provide agencies with experience in meeting the requirements of GPRA. This hearing was held to review the status of the civilian science agencies' progress and plans toward implementation of GPRA and to review public and private sector policies used in strategic planning and performance assessment for research and development activities. The first performance reports to Congress and the Administration are not due until the year 2000, but agencies are nonetheless required to have certain strategic planning

and performance reporting systems in place for the FY97 federal budget.

The hearing was structured in two panels. Witnesses on the first panel, which discussed industry views on implementation of GPRA, included: Professor Richard Zare, Department of Chemistry, Stanford University; Dr. James C. McGroddy, Senior Vice President and Special Advisor to the Chairman, IBM Corporation; and, Dr. Ernest Moniz, Associate Director for Science, Office of Science and Technology Policy, The White House.

The second panel, which addressed Administration views, consisted of: Dr. Anne Petersen, Deputy Director, National Science Foundation; Mr. Marc Chupka, Acting Assistant Secretary for Policy and International Affairs, Department of Energy; Dr. Robert Hebner, Acting Deputy Director, National Institute of Standards and Technology; Ms. Diana Josephson, Deputy Under Secretary, Department of Commerce, National Oceanic and Atmospheric Administration; Mr. Henry Longest II, Deputy Assistant Administrator for Management, U.S. Environmental Protection Agency; and, Mr. Gary Steinberg, Director for Strategic Management, National Aeronautics and Space Administration.

Summary of Hearing.

Witnesses on both panels were generally supportive of Congressional efforts to hold civilian R&D agencies accountable for their appropriated funds, as well as their performance. They did, however, ask for flexibility in complying with the 1993 law, since the results of many research projects are not apparent for many years. Witnesses also agreed that GPRA has forced their agencies to prioritize research projects and to keep close tabs on program progress.

Professor Richard Zane of Stanford University noted that, "Quantitative measures may not be feasible for basic research." He arrived at four conclusions for applying GPRA to the activities of the scientific community: (1) assessment of performance is an important function and responsibility of government and science cannot be immune from this measurement; (2) such assessments are feasible for fundamental science, but must rely on the judgments of those who understand the field, complemented, where appropriate by quantitative measures; (3) dominant reliance on quantitative measures will at best distort assessments and more likely prove destructive as research proposals and funding decisions are optimized for the measures rather than the best and most exciting science; and (4) performance measurements must consider the needs of multiple customers, especially in the field of fundamental science.

Dr. McGroddy of IBM stated that no research program can be effectively assessed unless researchers and sponsoring organizations agree on a set of basic principles. He outlined four principles for understanding performance assessment: (1) a research organization's goal must be to maximize the value it creates and delivers to its sponsor; (2) it is essential to couple the research effort to its immediate beneficiaries; (3) it is not possible to have too much contact between people in laboratories and the marketplace; and (4) the assessment process must drive change at a pace consistent with what is required. He emphasized that a major test of an as-

sessment and priority-setting process is its ability to stop "good" things to start better things.

Dr. Moniz of the Office of Science and Technology Policy at the White House stated that accountability to the public is essential, and that since the central purpose for basic research support is new knowledge, flexibility must be built into GPRA by the Congress to develop a meaningful system. He noted further that a combination of quantitative and qualitative measures are needed and should be phased in for evolving the system to meet Administration and Congressional needs; that agencies will tailor their GPRA assessment approach to their programs using these measures.

Dr. Anne Petersen of the National Science Foundation (NSF) said that NSF has a long-standing tradition of assessing quality using the competitive process of merit review to make wise investments and that GPRA is consistent with this tradition. She noted further that NSF has made significant headway in implementing GPRA principles and practices into the NSF budget process. She said NSF's greatest challenge is setting annual quantitative performance targets for some programs, due to the long-term nature of research outcomes and the danger of numeric targets perversely driving research. As a result, NSF is proposing use of an alternative format emphasizing descriptive goals.

Mr. Mark Chupka of the Department of Energy (DOE) said that DOE has been living with the GPRA philosophy for the past three years, and that implementation of a strategic management system that incorporates strategic planning, budget formulation and execution and program evaluation have produced important benefits over this time. He noted that strategic planning efforts reshaped DOE's mission and vision and focused business priorities. He noted further that identification of goals, strategies and measures facilitated the budget formulation and decision-making processes.

Dr. Robert Hebner of the National Institute of Standards and Technology (NIST) stated that in running various programs within NIST, a management team has been developed that requires a strategic plan. He said that because they are technology intensive they assess the technological progress occurring in this country as well as the world and also must understand industry's plans and expectations. Within this framework, GPRA fits well and NIST is comfortable with it.

Ms. Diana Josephson of the National Oceanic and Atmospheric Administration (NOAA) said that through participating as a GPRA pilot project, NOAA has gained experience in goal-setting measurement and reporting and in learning how to institutionalize the principles of GPRA. She said that goal-based budgeting is practical and is an important mechanism for communicating with the Congress NOAA's GPRA efforts. She also noted that one way NOAA intends to proceed with the implementation of the GPRA is through the use of performance partnerships with other agencies or entities.

Mr. Henry Longest II of the Environmental Protection Agency (EPA) said that GPRA brings together strategic planning and management, and links performance and results, and that EPA has "embraced the concept." He said GPRA principles of improving public confidence, holding agencies accountable and improving government effectiveness are being "incorporated into every facet of the

way we do business" at the Office of Research and Development (ORD). He concluded by saying that GPRA presents an opportunity to move beyond a planning cycle that is confined to a yearly budget cycle in order to better plan for the future.

Mr. Gary Steinberg of the National Aeronautics and Space Administration (NASA) said NASA believes the cornerstone of GPRA is the requirement that Departments and Agencies develop forward-looking strategic plans. He said that NASA's strategic plan improves with each update, the 1996 plan being the second update. The strategic plan, among other things, contains road maps which identify specific short-term and mid-term goals that must be accomplished to achieve long-term goals. He noted that NASA is still assessing the costs to implement GPRA, but that any costs incurred are necessary for the agency to continue to improve in strategic management.

4.1(i)—The Effects of a Six-Year Balanced Budget on Civilian Research and Development

July 23 and 24, 1996

Hearing Volume No. 104-74

Background

On July 23 and 24, 1996, the Committee on Science held a two-part hearing titled, "The Effects of a Six-Year Balanced Budget on Civilian Research and Development." The hearings examined the projected funding levels for the National Aeronautics and Space Administration (NASA), the National Science Foundation (NSF), and the Office of Energy Research within the Department of Energy (DOE) for the Fiscal Years (FY) 1998 to 2002. The funding levels proposed by President Clinton in his FY 1997 Budget request, and Congress in its FY 1997 Budget Resolution were evaluated to determine the effects on research and development (R&D) activities in the future. The hearing also offered the Members an opportunity to review President Clinton's initial rejection of a balanced budget, and to investigate the validity of outyear funding estimates for NASA, NSF, and DOE, in light of remarks made by Administration officials.

When the 104th Congress began, President Clinton presented a budget that projected deficits of at least $200 billion for the foreseeable future. Congress, however, continued to vigorously pursue a balanced budget and developed a comprehensive seven-year balanced budget. The President then submitted his FY 1997 spending request.

On March 19, 1996, he claimed that he had done what the Republican Congress had asked: developed a budget which achieves balance in 2002, as scored by the Congressional Budget Office (CBO). In April, however, CBO determined that the only way the President's plan will balance is by enactment of "contingent" budget proposals. These contingencies include $67 billion in additional unspecified cuts ($22 billion in 2001 and $46 billion in 2002). On April 17, 1996, in response to questions at a House Budget Committee hearing, CBO Director June O'Neill indicated that these

supplementary reductions could potentially fall on science programs.

When the Director of the Office of Management and Budget (OMB) testified before the House Budget Committee in March 1996, she reiterated the President's vow to preserve vital investments in science and technology. But individual agencies under the Science Committee's jurisdiction have expressed a lack of confidence in the legitimacy of the President's outyear projections, and OMB has admitted that some outyear numbers will be "refined further." For example, in a letter to Chairman Walker on May 29, 1996, NSF Director Neal Lane stated that, "The Administration has acknowledged in other forums that it is not realistic to make program-by-program decisions now for the year 2000 and beyond." Similarly, Administrator Dan Goldin testified before Senator Christopher Bond's Appropriations Subcommittee that, "The White House has instructed us to take no precipitous action on outyear budgets, and we are taking them at their word." And Dr. Krebs testified before the Energy and Environment Subcommittee of the Science Committee that the President's proposed reductions in energy research programs "were applied in a mechanical way and that they do not represent policy." Such inconsistency within the Administration resulted in confusion about the plan submitted to CBO, and led Chairman Walker to call these hearings to discuss the President's outyear estimates, to evaluate their validity, and to examine the potential effects on R&D programs, especially in 2001 and 2002.

Summary of Hearing

On July 23, the first day of the two-part hearing, one panel appeared before the Committee. Mr. James L. Blum, Deputy Director of the CBO, summarized CBO's evaluation of the budgets, and Dr. Albert H. Teich testified on behalf of the American Association for the Advancement of Science (AAAS).

On the second day, July 24, Senator Christopher S. Bond was the sole witness on the first panel. The second panel, which represented the Administration, included: Dr. Neal Lane, Director of NSF; Mr. Daniel S. Goldin, Administrator of NASA; and Dr. Martha Krebs, Director of the Office of Energy Research of DOE. Mr. Jack Lew, the Acting Director of OMB, informed the Committee that he would not attend and would not send a designee in his place.

July 23, 1996

Mr. James Blum, Deputy Director of CBO, testified that CBO used "more cautious economic assumptions" in order to certify that the President's budget would reach balance by 2002. As Mr. Blum explained, the President's budget request, as presented by OMB, includes two options. Under one option, the budget would be balanced under OMB's technical and economic assumptions. But under the other option, the contingent policies, which consist of much lower levels of spending for discretionary programs than under OMB's economic assumptions, would have to be implemented. Mr. Blum also summarized CBO's evaluation of the FY 1997 Budget Resolution and mentioned that it also has declining

nominal levels of discretionary spending in the outyears. He declined, however, to predict where such reductions would be made under either proposal.

Dr. Albert Teich, AAAS Director of Science and Policy Programs, presented AAAS's outyear budget calculations for both the President's plan and the budget resolution approved by Congress. Under the AAAS estimates, projected federal spending on R&D for NASA, NSF, and DOE General Science would be higher under the Congressional Budget Resolution than under President Clinton's FY 1997 request. The AAAS analysis acknowledged the additional unspecified discretionary cuts that will be necessary in 2001 and 2002 to achieve a balanced budget. Also important in his testimony were Dr. Teich's recognition of the fact that outyear projections are more significant, and his personal plea for critically needed entitlement reform.

July 24, 1996: Panel 1

In his statement, Senator Christopher Bond described what he calls the Administration's "two sets of books." As Chairman of an Appropriations Subcommittee, Senator Bond held hearings to ask Administration officials how they would handle the proposed outyear cuts in the President's budget. In his testimony, Senator Bond explains that Agency heads, including the Secretary of the Veterans' Administration, Jesse Brown, and the Administrator of NASA, Dan Goldin, admitted that they had been assured that the President's numbers are not real. In fact, Administrator Goldin was instructed by the White House to take no action. The Senator explained that he fears the President has two sets of books: one that he touts when he is defending his commitment to a balanced budget, and another that he uses when he is assuring people that he is not causing any real pain in these programs. Senator Bond expressed his disappointment that then-Director of OMB, Alice Rivlin, did not answer his questions about the discrepancy between the budget presented by OMB and the statements of the Administration officials.

July 24, 1996: Panel 2

Administrator Daniel Goldin assured the Committee that the President's budget numbers are real and that NASA is taking them very seriously. But he admitted he does not think it makes sense to cut programs back now "based on anticipated problems" and stated that the President will review spending priorities on a year-by-year basis. He noted, however, that the discretionary domestic spending cap would not change. He was unable to adequately explain how he can believe the President's numbers for NASA are real, *and* be so confident that they will increase after this year.

Dr. Martha Krebs reiterated that the Administration is committed to achieving a balanced budget as outlined in the President's plan. Having said that, however, she went on to explain that the President must have the flexibility to shift priorities each year and that "during each year's process, there will be opportunities to tie funding proposals to specific policies."

Dr. Neal Lane also repeated the Administration's mantra that future decisions must be made on a year-to-year basis, but insisted

that NSF and the President have a long-range outlook for science. He also joined Administrator Goldin in arguing that all the agencies that support science be coordinated and interactive, and that the Administration and Congress must look at the entire R&D budget as a whole. Finally, Dr. Lane spoke about the need to maintain world leadership in science and engineering, and argued for a scale that would measure the ultimate outcomes of these programs, or how they benefit people and the economy.

4.1(j)—Technological Solutions to Improve Aviation Security

September 19, 1996

Hearing Volume No. 104-78

Background

On September 19, 1996, the Committee on Science held a hearing entitled, "Technological Solutions to Improve Aviation Security." Earlier terrorist threats consisted mainly of hijackings and, as a result, walk-through metal detectors and conventional X-ray devices became the mainstay of the aviation community through the 1970's and 1980's. The escalation of terrorism in the 1990's, due in part to radical fundamentalist groups and the relative ease of access to lightweight and powerful explosive devices, has changed the face of terrorism and put airlines on U.S. soil at greater risk. The technology used by airports, however, has not changed since the 1970's. In 1989, the FAA established regulations that would eventually require the use of Explosive Detection Systems (EDS) to screen checked baggage at many U.S. airports. There are many technical issues that need to be resolved before a workable EDS system can be installed in the nation's airports. This hearing was held to address the current state, and the future direction of technology to lessen the risk of terrorist attacks on passenger planes; address the limitation of technological solutions; assess the costs of technological solutions; and discuss whether the Federal Government should be responsible for covering the cost of improved airline security.

The hearing was structured in two panels. Witnesses on the first panel, which discussed Administration views, included: Mr. David Hinson, Administrator, FAA; Mr. Keith Fultz, Assistant Comptroller General, GAO; and, Mr. Brian Michael Jenkins, Deputy Chairman, President's Commission on Aviation Safety and Security.

The second panel, which addressed industry concerns, consisted of: Dr. Lee Grodzins, Department of Physics, Massachusetts Institute of Technology; Mr. Aaron Gellman, Director, Transportation Center, Northwestern University; Mr. James Chapek, Sandia National Laboratory; and Professor Jack Beauchamp, California Institute of Technology.

Summary of Hearing

Panel 1: Administration Views

Mr. David Hinson commented that without the support of the Science Committee, FAA would not have been able to make the

progress it has in research, engineering and development programs to develop the next generation of counterterrorism technology. He noted that terrorists are increasingly sophisticated which is constantly changing the threats we face, and security systems must be capable of meeting these new challenges. The President set up a commission to look at airline safety and security following the crash of TWA 800, and Mr. Hinson outlined steps the FAA is taking with respect to Commission recommendations. He said placing equipment in the field is important, but so is ensuring that personnel operating the equipment are properly trained and qualified.

Mr. Keith Fultz stated that protection against terrorist attacks is an urgent national issue, and that most U.S. vulnerabilities are known by terrorists. He noted that since aviation is a target for terrorists we cannot afford to rely on small fixes and can no longer rely on the illusion that domestic aviation systems are being protected. He went on to outline inadequacies by FAA, other federal agencies, airlines, airports and freight forwarders. He stated that a mix of technology is needed to improve security. He stressed that for new technology to work, operators using them need to be capable and motivated. He noted that FAA has not conformed with a law passed in 1990 that required them to develop and deploy explosive detection systems by November, 1993. He said that only now since the most recent downing of TWA 800 has there been a flurry to fix security problems. GAO, he stated, has been calling on security improvements in reports dating back to 1994. He said GAO believes recommendations of the President's commission are headed in the right direction, but injected GAO views on what could be added to strengthen the recommendations. He concluded by stating that our current security system has significant vulnerabilities.

Mr. Brian Michael Jenkins noted that although hard to quantify, the terrorist threat to the United States is both real and high. He noted that Commissions under then-Vice President Bush following Pan Am 103 and now Vice President Gore following TWA 800 both concluded that airline security needs to be improved, and urged the development and deployment of effective explosive detection systems. He said that although there have been advances in explosives detection technology, we cannot afford to wait for further developments and the Commission recommends deployment of existing technology. The Commission also recommends doubling the number of dog sniffing teams the FAA currently has. He stated that technology is only part of the solution and the Commission recommends procedural and organizational changes as well. He said they further recommend the government fund initial measures. He noted that the commission also suggests that security improvements be achieved through an industry/government partnership.

Panel 2: Industry Concerns

Dr. Lee Godzins stated that if we are to win the war against terrorism we must use the best available technology, constantly replacing technology when better systems become available. He outlined the role of technology in fighting terrorism, how to implement it and how to maintain security in the face of dedicated, patient terrorists. He stated that security systems in place today are the

same as were in place before Pan Am flight 103 went down. Improved systems are available but have not been put in place, he said, because of a directive to wait for the perfect "magic bullet." He said this "magic bullet" will never come and advanced systems should replace current systems as they become available. He noted that the Commission's suggested funding for deploying improved systems is a good beginning, and that passengers will willingly fund technology upgrades. He said the Commission's recommendation of $20 million a year for R&D is not enough and estimates that at least $50 million is needed. He also said the war against terrorists is the government's problem not simply the airline's.

Mr. Aaron Gellman stated that aviation security needs cover a wide spectrum that include technologies as well as techniques. He said that what needs special attention is how to get relevant technology deployed. Desired results, he said, will most likely come through widespread publication of performance specification, rather than design specifications. He noted that a security program can only be maintained when the benefits equal or exceed the costs. He stated that the FAA is to be commended for not forcing impractical technology onto the market in crisis situations. He said that crisis and politically-driven investments and regulation need to be avoided. Mr. Gellman also stated that the greatest priority with respect to aviation security is explosives detection. He concluded by saying that we cannot wait for the best and must deploy what we have now.

Mr. James Chapek explained a project he worked on at BWI International Airport with respect to aviation security and how it involved the airport security system as a whole; airport operations, security people, maintenance people, etc. He said the project showed the importance of understanding the threat in order to develop the appropriate systems, and he outlined lessons learned. He noted that his job was to apply technology developed for the nuclear industry to airport security. One of the concepts, he said, was equal protection throughout the airport. He stated that the goal of the BWI project was to detect the weakest link in the system.

Professor Jack Beauchamp chairs the Committee on Commercial Aviation Security of the National Materials Advisory Board of the NRC under contract with the FAA to provide an assessment of their R&D programs in aviation security. He noted they are halfway through the study. He said the Committee has produced an interim report detailing the current state of technology with respect to research in advanced instrumentation for explosives detection. He stated that deployment of equipment has occurred mainly in Europe and hopes that the experience gained will lead to judgments about deployment in the United States. He said that although one would like to deploy only certified instruments for explosives detection, this is inappropriate and would inhibit the further development and improvement of advanced technology. He reviewed several types of explosives detection technologies. He stated that a combination of technologies and techniques would be most effective. He also stated that deterrence is probably one of the most effective tools to use in improving aviation security, as well as a flexible system that can change to reflect changing threats. Visible means of deterrence, like dogs, he said, are highly effective. He

concluded by saying that airlines, airports and the FAA need to work together.

4.2 SUBCOMMITTEE ON BASIC RESEARCH

4.2(a)—The 1996 National Science Foundation Authorization, Parts I and II

February 22 and March 2, 1995

Hearing Volume No. 104-6

Background

On February 22, 1995, and March 2, 1995, the Subcommittee on Basic Research held hearings entitled, "The 1996 National Science Foundation Authorization, Parts I and II" to obtain an assessment of the National Science Foundation (NSF) budget request and to explore broader policy issues that may be addressed in the NSF authorization legislation.

The NSF is an independent federal agency established in 1950 to promote and advance scientific progress in the United States. NSF builds U.S. scientific strength by funding research and education activities in all fields of science and engineering. This is done at more than 2,000 colleges, universities and other research institutions throughout the United States. The NSF budget comprised only about 3% of the federal R&D budget of $73 billion in FY 1995. However, NSF provides about 25% of basic research funding at universities and over 50% of the federal funding for basic research in certain fields of science, including math and computer sciences, environmental sciences, and the social sciences. Moreover, NSF plays an important role in pre-college and undergraduate science and mathematics education through programs of model curriculum development, teacher preparation and enhancement, and informal science education. The five-year NSF authorization law (P.L. 100-570) expired at the end of FY 1993.

Summary of hearings

February 22, 1995

Dr. Neal Lane, Director of the National Science Foundation, testified in support of the Administration's FY 1996 budget request of $3.36 billion (a three percent increase over 1995 levels) for the Foundation and defended the NSF's mission. The Director stated that the NSF has played a "critical" role in establishing the Nation's scientific base and has a "responsibility" to continue furthering U.S. scientific growth. He stated that NSF's budget request is guided by a strategic plan, entitled, "NSF In a Changing World." The plan sets three long-range goals for the NSF: world leadership; knowledge and service to society; and excellence in education at all levels. Dr. Lane also described the diverse mechanisms through which NSF supports researchers and illuminated how distinctions between basic and applied research can overlap. He also discussed the NSF's two primary missions: to ensure the best research in science engineering; and to promote excellence in science, engineering, and math.

March 2, 1995

Witnesses included: Dr. Julian Wolpert, Consortium of Social Science Association; Dr. Richard Herman, Chairman of the Joint Policy Board for Mathematics; Dr. Roland Schmitt, Chairman of the American Institute on Physics; Mr. James E. Sawyer, American Association of Engineering Societies; Dr. Cornelius J. Pings, President of the Association of American Universities; Dr. Rita Colwell, American Association for Advancement of Science; Dr. Pamela Ferguson, President of Grinnell College; and, Mr. Erich Bloch, former Director of NSF.

Dr. Wolpert testified on the importance of funding for the social, behavioral, and economic sciences within the NSF. He stated that the role of the social sciences is vital to the seven strategic areas funded by the NSF, and the social sciences provided support for practical applications of projects developed by the NSF. Additionally, he stated that the NSF should continue encouraging minority and women involvement in the social sciences.

Dr. Herman testified on the need for the NSF to continue its role in maintaining the leadership of the United States in science, mathematics, and engineering. Addressing the issue of balance in funding for discipline oriented research versus thematic programs, Dr. Herman stated that the NSF should concentrate and be evaluated on its aggregate effort in achieving its goals, rather than focus on a division of applied research and curiosity based research. Also, he suggested bolstering NSF involvement at the undergraduate level and for continued support of high performance computing, which has led to further research breakthroughs.

Dr. Schmitt testified in support of the Administration's budget proposal. He urged the elimination of any distinction between "applied research" and "curiosity-driven research" in the funding process; stating that both areas are complimentary, he feels projects should be evaluated on a common basis of merit. He further stated his support for the pause in funding for education programs under NSF until some re-evaluation is done. Dr. Schmitt also called for increased money to go to research facilities.

Mr. Sawyer stated that while recognizing the need to deal with the deficit, technology investment should not suffer in that process. Mr. Sawyer also noted concern for the lack of technology literacy among educators in grades K-12. He further elaborated on the amount of overlap between curiosity driven research and strategic research in applying technology.

Dr. Pings testified that NSF funding for basic research is important, especially in support of other agencies which concentrate on applied areas of technology. Dr. Pings stressed a need for the NSF to play a larger role in undergraduate education and supports an increase in funds to upgrade and build new facilities at universities.

Dr. Colwell noted that although she supports the Administration's FY 1996 budget proposal for the NSF, she is concerned about funding for R&D given the current fiscal climate. Dr. Colwell stated the importance of basic research in producing results which benefit the nation. Additionally, she advocated funding for academic facilities as part of the NSF's budget.

Dr. Ferguson testified on the importance of the undergraduate community in supporting national interests by providing a competent and skilled workforce. She expressed the need for the NSF to be active in the area of education. Dr. Ferguson also recommended the Subcommittee take action to ensure the NSF's ability to sustain U.S. leadership in science and engineering.

Mr. Bloch testified on the changing mission of the NSF over time and the danger of defining its objectives too narrowly. Mr. Bloch suggested that the NSF could better allocate its resources if certain outdated rules and regulations which affect the agency were reviewed for possible elimination. He also emphasized his desire to see more funding for education and human resources within the NSF.

4.2(b)—Alternative Futures for the Department of Energy National Laboratories: "The Galvin Report" and "National Laboratories Need Clearer Missions and Better Management, a GAO Report to the Secretary of Energy."

March 9, 1995

Hearing Volume No. 104-11

Background

On March 9, 1995, the Subcommittees on Basic Research and Energy and Environment held a joint hearing entitled, "Alternative Futures for the Department of Energy National Laboratories: "The Galvin Report" and "National Laboratories Need Clearer Missions and Better Management, a GAO Report to the Secretary of Energy." (See also page 131.)

This hearing focused on alternative futures and clearer missions/management of the Department of Energy's National Laboratories, based on the recommendations of the Galvin Task Force and the GAO. When the Department of Energy was created in 1977, it inherited the National Laboratories with a management structure that had evolved from the World War II "Manhattan Project," whose mission was to design and build the world's first atomic bombs. From this national security mission, the laboratories generated expertise that initially developed nuclear power as an energy source. The laboratories' missions broadened in 1967, when the Congress recognized their role in conducting environmental as well as nuclear energy, public health and safety-related research and development. In 1971, the Congress again expanded the laboratories' role, permitting them to conduct non-nuclear energy research and development. During the 1980's, the Congress enacted laws to stimulate the transfer of technology from the laboratories to U.S. industry. The Department of Energy estimates that over the past 20 years, the Nation has invested more than $100 billion in the laboratories.

The 1990's have accelerated the laboratories' diversification from defense and nuclear research to environmental issues and the development of commercial technologies.

The purpose of this hearing was to identify and examine the principal issues affecting the laboratories' missions and the Depart-

ment of Energy's approach to laboratory management. Witnesses were presented in three panels.

Panel one consisted of: Mr. Robert Galvin, Chairman of the Task Force on Alternative Futures for the DOE National Laboratories (and Chairman of the Executive Committee of Motorola Inc.), and the Honorable Hazel O'Leary, Secretary of the U.S. Department of Energy.

The second panel included: Dr. Siegfried Hecker, Director of Los Alamos National Laboratory; Dr. Bruce Tarter, Director of Lawrence Livermore National Laboratory; and Dr. Albert Narath, President of Sandia National Laboratories.

Panel three included: Dr. John Denson, Director of Idaho National Engineering Laboratory; Dr. Charles Gay, Director of the National Renewable Energy Laboratory; Dr. Nicholas Samios, Director of Brookhaven National Laboratory; Dr. Alan Schriesheim, Director of Argonne National Laboratory; Dr. William Madia, Director of the Pacific Northwest Laboratory; Dr. Charles Shank, Director of Lawrence Berkeley Laboratory; and Dr. Alvin Trivelpiece, Director of Oak Ridge National Laboratory.

Summary of hearing

Panel 1

Mr. Galvin testified that a bold plan of action was needed to salvage and restructure DOE. He emphasized five primary missions of the National Laboratories: national security; energy; environmental cleanup; economic development with appropriate industry; and science and engineering. He also encouraged the labs to function as a single entity with a focus on core missions; DOE to streamline radically; and Congress to bear the brunt of the responsibility for a new system of governance for the labs. He recommended that the laboratories be corporatized, a major energy agenda be embraced, and Congress recommit support for national defense for a minimum of forty years.

Secretary O'Leary discussed the Galvin report stating that she agreed with many of the recommendations but disagreed with the recommendation to corporatize the National Laboratories. She supported the concept of managing the laboratories like a corporate entity. Secretary O'Leary noted the realities DOE must face as the national security focus changes to accommodate dismantling weapons, non-proliferation, and maintaining a safe and reliable stockpile. She also presented the improved cleanup record of DOE and the role she envisions for DOE's environmental management team.

Panel 2

Dr. Hecker stressed returning to GOCO management, rather than corporatizating, allowing for flexibility and independence within the labs. He emphasized that the labs must work with industry to maintain the high level of technology and to provide leverage to garner federal research investment, cautioning Congress to carefully consider any cutbacks in this area. According to Dr. Hecker, Congress must allow DOE to redefine its own missions, as well as those of the labs—then, make it a goal to downsize the labs

in the right manner, for the best productivity and service to the nation.

Dr. Narath urged Congress to proceed cautiously when considering DOE mission differentiation, so that multipurpose labs do not become single-purpose labs. He advises DOE to take advantage of the diversity, to create a "system of laboratories," seeking more inter-lab cooperation. He also stressed the importance of the university and industry partnerships with the labs, which will be critical to DOE's success as it moves from a nuclear weapons mission to pursuing missions relating to energy, environment, and basic science.

Dr. Tarter testified that strong leadership from DOE and reduced government management will make the labs both more efficient and cost-effective. He expressed concern about downsizing the labs and believes that as the missions and the leadership of DOE are improved and defined, the question of size will take care of itself. Dr. Tarter stated that adhering as closely as possible to the original GOCO format would maintain the strength of excellence and the missions of the labs.

Panel 3

Dr. Denson endorsed a "system of laboratories," where the National Laboratories act as one entity. He noted that the primary missions of DOE will be strengthened by a well directed technology transfer program.

Dr. Gay discussed a performance-based award fee "report card" from DOE and "sunset clauses" which provide criteria for technology development projects. He spoke against corporatizing the labs but recommended the "privatization of technologies" for spin-off technology. He also approved of DOE's strategic realignment.

Dr. Samios testified that the problems of the labs have ensued because of short-term goals and the governance imposed by Congress and the Administration (i.e., too much regulation and red-tape). He stated that a long-term plan is definitely needed to address these issues. He spoke in support of government investment in large-scale scientific user facilities to "push the frontier of science" and to close older facilities which are no longer cutting edge, while creating state of the art facilities to comply with DOE/laboratory missions.

Dr. Schriesheim stressed the importance of the ties between energy and environmental technologies and the global impact of how to achieve effective environmental growth and balance. He backed DOE's Scientific Facilities Initiative, which increased the availability of facilities for industry and university users. Dr. Schriesheim endorsed external regulation by EPA, OSHA, and NRC, rather than DOE regulation, to improve the GOCO system.

Dr. Madia testified that when encouraging a stronger missions focus a model must address "cross-fertilization" of technologies and application of the unique laboratory system. He stated that forces of supply and demand will naturally determine laboratory capacity and a business approach is necessary in assignment and flexibility of R&D. He also stated that environmental technology and energy research are the best solution to pursue in order to ensure economic energy and environmental security.

Dr. Shank affirmed that national security depends on a scientific foundation enhancing and paralleling national interests. The National Laboratories are a cornerstone of enduring U.S. leadership. He cited that the "most exciting scientific advances are occurring at the boundaries between the fields." Each area plays off the other in terms of technology, innovation, and application of disciplines.

Dr. Trivelpiece underscored that the GOCO concept of governance has been severely neglected and that it must be given a chance to improve and revitalize itself before it is abandoned altogether.

4.2(c)—U.S. Fire Administration FY 1996 Budget Request

March 16, 1995

Hearing Volume No. 104-7

Background

On March 16, 1995, the Subcommittee on Basic Research held a hearing entitled, "U.S. Fire Administration FY 1996 Budget Request," to assess the USFA's budget request and to examine long range budget and policy issues that may be addressed in authorization legislation to be developed by the Subcommittee. The USFA coordinates the nation's fire safety and emergency medical service activities. The USFA's budget request for 1996 is $28.9 million, a decrease of over $5 million from FY 95's current estimate. The 1995 estimates reflect a net increase of $3.2 million appropriated to the USFA for the Arson Control Program, testing fire suppression agents, and the Vermont Fire Service Training Center.

Witnesses included: the Honorable Steny Hoyer (MD-5); the Honorable Carrye Brown, Administrator of the United States Fire Administration (USFA); Mr. Gary Tokle, representing the National Fire Protection Association (NFPA); Mr. Francis McGarry, President of the National Association of State Fire Marshals; Bill Jenaway, Congressional Fire Services Institute's Executive Board; and Mr. Dan Shaw, New Mexico Fire Department.

Summary of hearing

Congressman Hoyer testified on the importance of the USFA in training career and volunteer firefighters and its role in helping to reduce fire related casualty and injury rates in the United States. Mr. Hoyer raised the issue that agencies should have incentives to save money and not feel the need to spend surpluses to avoid cuts in the next fiscal year. Also, he cautioned that Congress should carefully consider any cuts in the USFA's authorization request.

Administrator Brown emphasized four areas which the USFA considers priorities and is concentrating its efforts: (1) public education; (2) fire data collection and analysis; (3) fire services training; and (4) fire technology and research. She stated that she is reviewing agency programs to eliminate duplication and find areas for privatization. In addition, Mrs. Brown reaffirmed the commitment of the FEMA and the USFA to public safety.

Mr. Tokle emphasized USFA and NFPA support of state governments, localities, and the private sector in their efforts with re-

gards to the four areas previously mentioned by Admin. Brown. Mr. Tokle feels there should be a federal role in fire safety, but that role should not duplicate or conflict with private sector initiatives. As an example of public private cooperation he pointed out the National Fire Incident Reporting System which has contributed to the reduction of fire fatalities and injuries.

Mr. McGarry urged the Subcommittee to carefully consider all cuts to USFA funding and apply a standard of fairness in that process. He stated support for the USFA's current mission in assisting firefighters and feels it is appropriate federal involvement. Citing a recent survey of State Fire Marshals, Mr. McGarry stated that the two most important USFA programs were the National Fire Academy and the National Fire Incident Reporting Service.

Mr. Jenaway testified that CFSI supports funding for the USFA and discourages any cuts in its budget. Mr. Jenaway reiterated a point made previously that the United States is behind other industrialized nations in terms of fire safety. Also, he stated that the CFSI advocates a federal role in guiding States and localities efforts at fire protection and feels more opportunities and training should exist at the local level.

Mr. Shaw testified on the cost effective role of the Federal Government in providing essential services to local fire departments. He told the Subcommittee about the benefits his department and community, with their limited resources, have received from the USFA programs. He suggested the use of on-line technology to bring information and resources to local fire departments more efficiently and cost effective.

4.2(d)—Science, Environment, and Technology Summit: A Long-Term National Science Strategy

June 1, 1995

Hearing Volume No. 104-17

Background

On June 1, 1995, the Subcommittee on Basic Research held a hearing entitled, "Science, Environment, and Technology Summit: A Long-Term National Science Strategy," in Oak Ridge, Tennessee (as part of the Oak Ridge Summit on Science, Environment, and Technology) to hear testimony on the roles of public and private interests in a long-term science strategy for the United States. The discussion focused on the future of university-government-industry research and development (R&D) relationships and the reorganization of the federal research infrastructure.

Witnesses included: Dr. Neal Lane, Director, National Science Foundation (NSF); Dr. Martha Krebs, Director, Office of Energy Research, Department of Energy (DOE); Dr. John McTague, VP of Technical Affairs, Ford Motor Company; Dr. Alvin Trivelpiece, Director, Oak Ridge National Laboratory; and Dr. Joseph H. Hamilton, Chairman, Department of Physics and Astronomy, Vanderbilt University.

Summary of hearing

Dr. Lane highlighted NSF's contribution to maintaining a strong national science establishment. He explained NSF's responsibility to safeguard and enhance the nation's scientific future by supporting excellent research in every area of science and engineering. Dr. Lane emphasized that natural connections exist between fields of science and the most exciting breakthroughs come at points where disciplines overlap. According to Dr. Lane, benefits from the discovery of new knowledge require a healthy science enterprise resulting from partnerships between research universities, the national laboratories, the technology centers, and various industry consortia. He indicated that through these partnerships, new knowledge can reach those who seek to use and apply it. In addition, Dr. Lane highlighted the practice of research and teaching together in U.S. institutions of higher education which capitalizes on the natural and complementary connections between the process of education and that of discovery. He emphasized NSF's commitment to helping universities foster those natural connections through a number of innovative programs designed to increase the participation of undergraduates in research.

Dr. Krebs addressed the DOE's role in the nation's long-term science strategy as well as the science and technology assets of the DOE's national laboratories. She pointed out the high return on public and private science and technology investments during the last half century and noted the decline in corporate research since the end of the Cold War. Dr. Krebs emphasized that the DOE's energy mission requires marshaling of the science and technology that underlies future energy technologies while also achieving the appropriate balance and coordination of federal and private investment. In order to fulfill the DOE's missions and solve national problems, she highlighted the importance of the Department's collaborations with universities, industry, and other federal agencies. According to Dr. Krebs, the DOE national laboratories are a unique aspect of the Department's investment in fundamental science and a critical element of the Nation's science infrastructure which keeps the United States at the forefront of international science. She indicated that these facilities support more than 15,000 users and are the result of $100 billion of federal investment during the past 50 years.

Dr. McTague explained that in the spirit of eliminating the federal deficit, the United States must devise a set of principles and actions to maximize the leverage of science and technology for national goals. In order to establish a long-term strategy, according to Mr. McTague, we must decide what the Federal Government should be doing; where our comparative advantages lay; what areas should be strengthened and how; what should be eliminated; and where the government should lead, where it should be a partner and where it should stay out of the way. Mr. McTague pointed to parallels between President Reagan's successful science and technology policy in the 1980's and the present emphasis on federal investment in basic research, avoidance of short-term commercial development and cooperation in technology development. He indicated that the Federal Government, just as the private sector, has realized that two-way, hands-on cooperation is by far the best way

to transfer technology. Mr. McTague explained that as cooperative R&D interactions have evolved and matured, they have resulted in more effective commercial implementation and have also strengthened the capability of the federal laboratories to perform their traditional core missions.

Dr. Trivelpiece addressed the role of the DOE national laboratories in U.S. research and development enterprise. According to Dr. Trivelpiece, new R&D management approaches are needed to sustain the technical integrity and excellence of the scientific programs at the national labs and to prepare the labs to respond to the challenges of the future. He explained that the national laboratories' ability to conduct large-scale, long-term, integrated research projects has produced a remarkable set of contributions in the past, ranging from fundamental scientific discoveries to commercial products which have improved national security, economic productivity, human health, and environmental conditions. Dr. Trivelpiece stated that the labs' success in applying science and technology to national challenges derives in part from a special organizational structure that supports long-term, high-risk, problem-focused R&D. In order for the labs to continue in the tradition of providing valuable science, Dr. Trivelpiece encouraged a balanced investment in the nation's science infrastructure that will contribute to the goal of sensible federal spending.

Dr. Hamilton emphasized the critical role of university-laboratory partnerships in ensuring the health and strength of basic research performed in the United States as well as the training of future scientists. According to Dr. Hamilton, expanding these partnerships encourages effective use of limited financial resources, sharing of scientific talent and ingenuity, and maximization of the strengths of both institutions. He particularly encouraged the development of partnerships between state governments and their universities to generate cooperative project investments which produce world-class scientific facilities.

4.2(e)—Federal Technology Transfer Policies and Our Federal Laboratories: Methods For Improving Incentives For Technology Transfer at Federal Laboratories

June 27, 1995

Hearing Volume No. 104-13

Background

On June 27, 1995, the Subcommittee on Technology and the Subcommittee on Basic Research held a joint hearing entitled, "Federal Technology Transfer Policies and Our Federal Laboratories: Methods For Improving Incentives For Technology Transfer at Federal Laboratories," to receive testimony regarding the transfer of technology from federal laboratories. (See also page 218.)

The hearing explored the effectiveness of our federal technology transfer laws and methods in which they may be improved. Witnesses also provided comments on the circulated draft text of H.R. 2196, the "The Technology Transfer Improvement Act of 1995," proposed by Mrs. Morella.

The hearing was structured in three panels. Witnesses on the first panel, which gave a historical overview of federal technology transfer policies and discussed the methods of technology transfer, included: Mr. Joe Allen, Director of Training, Marketing and Economic Development at the National Technology Transfer Center; Dr. Robert Templin, President of Virginia's Center for Innovative Technology; Ms. Tina McKinley, Chair of the Federal Laboratory Consortium at Oak Ridge Institute for Science and Education; and Mr. John Preston, Director of the Technology Development of MIT, representing the Association of University Technology Managers.

Panel two, which featured representatives of the Department of Energy laboratories which have engaged in technology transfer activities, included: Ambassador C. Paul Robinson, Vice President, Laboratory Development, Sandia National Laboratory; Dr. Ronald W. Cochran, Laboratory Executive Officer, Lawrence Livermore National Laboratory; Mr. Richard Marczewski, Manager, Technology Transfer Office, National Renewable Energy Laboratory; Dr. Peter Lyons, Director, Industrial Partnership Office, Los Alamos National Laboratory; and Mr. William Martin, Vice President, Office of Technology Transfer, Oak Ridge National Laboratory.

Panel three, which included representatives of companies which have developed new products and applications with federal laboratories, consisted of: Mr. Michael Ury, Vice-President of Fusion Lighting; Mr. Tom Fortin, Vice-President and CFO of Rio Grande Medical Technologies, Inc.; and Mr. William Elkins, Chairman of Life Enhancement Technologies.

Summary of hearing

Panel 1

Mr. Allen commended Mrs. Morella on her legislation. He identified three key components of the legislation: (1) it is market-driven; (2) there are incentives for laboratories and scientists; and (3) intellectual property is given to companies who commercialize the technology. He stated our ultimate goal should be linking federal laboratories, universities, and state and local business assistance programs strategically with U.S. industry in locally led initiatives.

Dr. Templin stated that assessing the return on investment from technology transfer is difficult, but crucial. He said we must look at jobs, companies, and competitiveness to determine its value. Dr. Templin also commented on the need to get authority to the local laboratories so the labs can enter into agreements, allowing them to be more responsive to market-driven needs.

Ms. McKinley testified to her support for the legislation, and indicated it will contribute to the speed and effectiveness of federal technology transfer. She explained that all technology is different and volatile. She said flexibility is necessary, laboratories have to be able to select from a range of mechanisms depending on the situation. She added, "The fact is, technology transfer, like politics, is local."

Mr. Preston stated that we must use technology transfer to remain competitive internationally. The net effect of our sluggishness to commercialize technology, he added, is American ideas and inventions are adopted by foreign competitors rather than U.S. com-

panies. He said we should, "level the playing field by creating industrial research competitiveness that rivals what our foreign competitors are doing." He stated that there is a critical need for new approaches to technology commercialization, and that we need to have the courage to lower the bureaucracy that stifles entrepreneurship.

Panel 2

Ambassador Robinson testified on the uniqueness of the nation's DOE laboratories as "multi-problem solvers" for U.S. industry, which is what industry seeks and what the labs can best deliver. Ambassador Robinson feels the process by which technology partnerships are developed should be streamlined to improve efficiency. In response to criticism that technology partnerships were giveaways to individual companies, he stated that SNL is increasingly working with a consortia of U.S. companies. Also, SNL is now involved with medium and small size firms, an area Ambassador Robinson would like to see expanded. He stated that the national labs benefit by seeking ways their long-term goals can be leveraged by industry's aims.

Dr. Cochran testified that industrial partnering is vital to the future success of LLNL's programs. He stressed that continued Congressional leadership is essential to further refine the technology transfer system and keep it viable. Dr. Cochran also expressed support for Rep. Morella's bill as a way to build on past experience with industrial partnering. He also stated the labs must have many options available when seeking out technology partnerships and to listen to industry as the best way to gauge the effectiveness of partnerships.

Mr. Marczewski testified that CRADAs are only one mechanism used by NREL to transfer technology and that the labs should have a variety of mechanisms at their disposal to bring technology to the market. He further stated that NREL plans to increase their use of licensing in the future and will actively seek access to foreign markets by acquiring foreign patents. Although Mr. Marczewski feels NREL should aggressively pursue partnering opportunities, he feels the labs core competencies should not be compromised in the process.

Dr. Lyons testified that reducing the global nuclear danger is LANL's central mission and LANL must utilize the best sources of domestic science and technology to meet such a multi-faceted goal. Therefore, Dr. Lyons feels alliances with industry are very important to sustain and to expand that base of domestic science and technology. He feels partnerships with industry help LANL's core competencies and agrees with the need for flexibility in finding ways to work with industry. He voiced support for provisions within Rep. Morella's bill which strengthen the CRADA mechanism. Dr. Lyons also urged for the continued funding of the Technology Transfer Initiative as, he feels, it is vital for future partnerships LANL enters.

Mr. Martin testified that Rep. Morella's bill is a "win-win" situation for government and the private sector. Mr. Martin stated that federal agencies must fulfill their missions as assigned by Congress and what should be addressed at this time is how to improve the

process of technology transfer. One improvement which should be made, according to Mr. Martin, is to make industry better aware of the applicability of government developed technology. Further, he expressed a need to get industry involved earlier in the R&D process and reduce bureaucratic barriers to technology transfer.

Panel 3

Mr. Ury asserted that without the help from the DOE and Lawrence Berkeley Laboratory, successful of development of sulfur lights would be too risky to embark on and not as timely. He said the government should have a role in developing high energy lighting. Currently, he stated, only one major lamp company is U.S.-owned. He said one of the benefits from DOE's involvement in lighting has been to stimulate a higher level of investment by the lighting companies in new technology.

Mr. Fortin testified that without the technology transfer link to Sandia National Laboratory his company would not have had the opportunity to produce the noninvasive glucose monitor for diabetics. He stated that this small collaboration has shown that technology transfer from federal laboratories can make contributions toward solving real world problems.

Mr. Elkins stated that government labs need to have incentives to get the job done. Labs need to recognize who they serve, he argued, and increasing incentives for labs is essential.

4.2(f)—Graduate Level Science and Engineering Education

July 13, 1995

Hearing Volume No. 104-19

Background

On July 13, 1995, the Subcommittee on Basic Research held a hearing entitled, "Graduate Level Science and Engineering Education," to discuss the graduate education of America's scientists and engineers and how best to prepare them for future success. The Ph.D. educated scientist and engineer play a central role in the prosperity, security, and competitiveness of our nation. According to the National Academy of Sciences' Committee on Science, Engineering, and Public Policy (COSEPUP) report, modifications must be made to America's system of graduate education in order to ensure the success of our next generation of scientists.

The COSEPUP report examines graduate education in the context of the end of the Cold War era, as the traditional places of employment for Ph.D. scientists and engineers are experiencing pressure to downsize in response to a reduction in defense spending and other federal and corporate downsizing. The report predicts continued decline in traditional employment opportunities in academia and makes several recommendations for helping students meet this reality.

Among the Committee's recommendations is that U.S. universities do a better job in preparing students for alternative careers by increasing flexibility and versatility in the degree program and by providing more relevant career counseling. The report rec-

ommends limiting the time it takes to receive a degree and changing the amount of assistantships versus fellowships.

Witnesses included: Dr. Phillip Griffiths, the Committee on Science, Engineering, and Public Policy; Dr. Neal Lane, Director of the National Science Foundation (NSF); Dr. Harold Varmus, Director of the National Institutes of Health (NIH); Dr. Kevin Aylesworth, founder of the Young Scientists Network; Dr. Mark Wrighton, Chancellor of Washington University; Dr. George Walker, Chair of the Council of Graduate Schools and Vice President for Research and Dean of Graduate School at Indiana University; Dr. Ned Heindel, Department of Chemistry at Lehigh University; and Dr. Joseph Miller, Senior Vice President of Central Research and Development, DuPont Corporation.

Summary of hearing

Dr. Griffiths discussed the myths and realities related to the education of the nation's graduate students. Dr. Griffiths dispelled the following myths: that most Ph.D.s pursue careers in academia; and that there is a high rate of unemployment among Ph.D.s. He also noted that the number of Ph.D.s employed in business and industry is increasing; the time required to secure employment and complete Ph.D. study has also increased; and more Ph.D.s are working in temporary positions in order to put themselves in line for tenure track jobs. Dr. Griffiths stated that increased versatility on the part of students and universities are important steps for the future. Dr. Griffiths also suggested that students need better career information and guidance, that time to degree be restricted, and that the grant structure be modified.

Dr. Lane noted that the NSF has several programs in place which are helping to improve the overall prospects for the future scientists in this nation. He also added that the NSF recognized the need to work with universities before enacting any change in policy. Dr. Lane endorsed much of the COSEPUP report's analysis of the current state of graduate education as well as its recommendations for improvement.

Dr. Varmus testified that the field of biomedical research is in transition, and while the transition has increased anxiety among graduate students, there is growth in non-traditional occupations. He further stated that the NIH is currently in the process of expanding its training program to the areas put forth in the COSEPUP report.

Dr. Aylesworth discussed the shift following World War II in which foreign graduate students moved into positions vacated by American graduate students. He also pointed out that graduate students are often seen as little more than a source of cheap labor in pursuit of research goals. Dr. Aylesworth concluded that the education system should be more open to diversification and the United States should do more to limit the influx of foreign graduate students.

Dr. Wrighton testified that the real challenge to Ph.D. employment lies in creating a partnership between business and industry. He also emphasized the need to broaden the graduate experience. Dr. Wrighton stated that university faculties need to play a more active and supportive role in the graduate experience.

Dr. Walker reaffirmed the findings of the COSEPUP report. He agreed with Dr. Wrighton that the graduate experience needs to be broadened.

Dr. Heindel testified to his support for programs that would increase the breadth of graduate education to keep pace with the increasingly competitive workplace. Dr. Heindel also stated that the time needed to complete a graduate education had become unnecessarily long.

Dr. Miller discussed industry's need for graduates with a broad educational background. He agreed with the COSEPUP report and recognized the need for increased participation by women and minorities at the Ph.D. level.

4.2(g)—Cyberporn: Protecting Our Children from the Back Alleys of the Internet

July 26, 1995

Hearing Volume No. 104-16

Background

On July 26, 1995, the Subcommittees on Basic Research and Technology met jointly to explore the ramifications of cyberporn in our society. This hearing, entitled, "Cyberporn: Protecting Our Children from the Back Alleys of the Internet," began as the first in a series of hearings focusing on the Internet and issues affecting high performance computing and communications, and the information highway. (See also page 223.)

The Internet has become the gateway for information, education, and entertainment. As more and more users participate on the Internet, it is also becoming a forum where children have been exposed to obscene and pornographic material. This access to pornography has greatly disturbed parents, Congress, and the American public. This proliferation of pornographic and obscene materials available on the Internet is one of most difficult issues confronting Internet use. Before identifying a new role for government, the hearing provided for a discussion of methods already available in the private-sector marketplace to allow users and on-line service providers to control the types of materials coming into homes, schools, and businesses. The hearing also provided Members with a full understanding of solutions already available before upcoming Congressional consideration of new government regulation or new criminal laws regarding pornography and the Internet.

Witnesses included: Mr. Tony Rutkowski, Executive Director, Internet Society; Ms. Ann Duvall, President, SurfWatch Software, Inc., Mr. Steven Heaton, General Counsel and Secretary, CompuServe; Mr. Kevin Manson, Legal Division of the Federal Law Enforcement Training Center (FLETC); Mr. Mike Geraghty, Trooper, New Jersey State Police; and, Mr. Lee Hollander, Assistant States Attorney, Naples, FL.

Summary of hearing

Mr. Rutkowski testified that the Internet has grown from an enormous, creative grassroots environment. Legislation already in

place is sufficient, according to Mr. Rutkowski, because only a small percentage of the overall traffic flow on the Internet is of an objectionable nature. Because of its very size and scope, he stated that the Internet would be almost impossible to police—that such traditional regulation would invariably create more damage, especially in terms of international involvement and the complexities of multiple jurisdictions at that level. He emphasized an important fact which cannot be ignored—the Internet is "poised to emerge as a major backbone of the global economy."

Ms. Duvall describes the Internet as a "pioneering community" which serves as a social tool, as well as a technological tool and it was in this interest that SurfWatch was born. Though she feels that it is unusual for a technological product company to be involved as a solution to the societal hazards presented by the Internet, she recognizes that private industry will have a large role to play in the spectrum of troubleshooting techniques for the Internet, responding to the evolution generated by Internet's rapid development. She acknowledges the importance of parental control in choosing the information they deem appropriate for their children to view. Thus, the SurfWatch Manager database is ideal for unsophisticated users because of the frequent updates to the database and the simple design of the system. She reiterated Mr. Rutkowski's stance that government regulation might destroy the global opportunities afforded by the Internet, especially in light of the fact that 30% of the sites blocked by SurfWatch originated outside United States jurisdiction. She emphasized that parental guidance and education are the best tools with which to monitor the Internet and safeguard our children.

Mr. Heaton stressed that the key to securing the Internet lies in customizing personal computers, because that is the primary point of convergence of all on-line activities. Compuserve is evaluating the use of several software technologies as solutions to be applied for this purpose, including SurfWatch, NetNanny, Cybersitter, and Internet-In-A-Box. This allows freedom of choice for parents, educators, etc., to decide what is acceptable and unacceptable information to access. He states that Compuserve's goal is to empower users, specifically parents, through education and technology. He observed that existing obscenity laws are more than satisfactory in dealing with the criminal element whose specialty is concentrated in "computer media" and that the role of government should be in educating users to the risks and benefits of the online environment, to legislate the policy of individual responsibility in this arena, and to encourage development of new technologies in cyberspace.

Mr. Manson testified regarding his operation of CYBERCOP, a non-governmental, not-for-profit Bulletin Board System, whose mission is "networking and education on the electronic frontier." He stated that law enforcement is rapidly finding itself overtaken by technology of the future. He said the solution to problems associated with computer-porn will be found in new partnerships between business and law enforcement.

Mr. Geraghty stated pedophiles are using the Internet as a new means to distribute information. He said the laws are already in place to assist in catching computer criminals, it is the training of law enforcement personnel that needs to be addressed. He ex-

plained that it is crucial for law enforcement to keep up with the technology.

Mr. Hollander testified that the law is developing in this area. A lot of issues must be considered, he added, including the Fourth Amendment Search and Seizure, obscenity laws, and jurisdictional issues.

4.2(h)—Restructuring the Federal Scientific Establishment: Future Missions and Governance for The Department of Energy (DOE) National Laboratories, H.R. 87, H.R. 1510, H.R. 1993 (Title II), and H.R. 2142

September 7, 1995

Hearing Volume No. 104-30

Background

On September 7, 1995, the Subcommittees on Basic Research and Energy and Environment held a joint hearing entitled, "Restructuring the Federal Scientific Establishment: Future Missions and Governance for The Department of Energy (DOE) National Laboratories, H.R. 87, H.R. 1510, H.R. 1993 (Title II), and H.R. 2142," on the restructuring of the DOE National Laboratories. (See also page 134.)

During the 104th Congress, several legislative proposals have been introduced which would significantly restructure the DOE National Laboratories. Pending legislation includes proposals to: restructure and terminate some or all the labs; effect major reductions in personnel at the non-defense program labs; and review and assign narrower missions for the labs in conjunction with possible streamlining. Another issue addressed in some of the legislative proposals is governance of the labs, whether by DOE through a more traditional Government-owned, contractor-operated (GOCO) role, with or without DOE internal regulation, or through corporatization/privatization of the labs.

This is the second in a series of hearings in which the Committee on Science is examining options for restructuring the federal scientific establishment. The goals of this legislative hearing will be to examine the role of the DOE laboratories within that broader context, and specifically, to receive testimony on four pieces of legislation pending before the two Subcommittees: H.R. 2142, the "Department of Energy Laboratory Missions Act" (Mr. Schiff); H.R. 87, the "Department of Energy Laboratory Facilities Act of 1995" (Mr. Bartlett); Title II of H.R. 1993, the "Department of Energy Abolishment Act" (Mr. Tiahart); and H.R. 1510, the "Department of Energy Laboratories Efficiency Improvement Act" (Mr. Roemer).

Witnesses were presented in three panels following the testimony of the Honorable Charles B. Curtis, Acting Deputy Secretary of the U.S. Department of Energy.

Panel one included: Mr. Robert W. Galvin, Chairman of the Executive Committee of Motorola Inc.; Mr. Erich Bloch, Acting President and Distinguished Fellow of the Council on Competitiveness; Dr. Charles M. Vest, President of the Massachusetts Institute of Technology; Mr. Sherman McCorkle, President of Technology Ven-

tures Corporation; and Dr. Bruce L.R. Smith, Senior Staff at the Brookings Institute.

The second panel, which consisted of DOE contractors, included: Dr. Frederick M. Bernthal, President of the Universities Research Association; Dr. Albert Narath, President of the Energy and Environment sector at the Lockheed Martin Corporation; Dr. Douglas E. Olesen, President and CEO of Battelle Memorial Institute; and Dr. C. Judson King, Interim Provost at the University of California.

Panel three included directors of national laboratories: Dr. Charles F. Gay, Director of the National Renewable Energy Laboratory (NREL); Dr. Siegfried S. Hecker, Director of the Los Alamos National Laboratory; Dr. Alan Schriesheim, Director of Argonne National Laboratory; Dr. C. Bruce Tarter, Director of Lawrence Livermore Laboratory; Dr. Alvin W. Trivelpiece, Director of Oak Ridge National Laboratory; and Dr. John C. Crawford, Executive Vice President of Sandia National Laboratories.

Summary of hearing

Deputy Secretary Curtis testified that DOE is actively trying to bring down costs while enhancing R&D efficiency and performance at the National Labs. He stated that the Department has not forced its nine multi-program laboratories into tightly defined missions so not to sacrifice their versatility. Mr. Curtis spoke in support of H.R. 2142, and its efforts aimed at creating a refined mission framework for the National Laboratories. He does not support H.R. 1510's mandated reduction of DOE laboratory personnel by one-third over 10 years. He says the reduction would dictate how much work could be performed at the DOE labs through a steady constriction of their employment rolls. He also spoke against H.R. 87 and Title II of H.R. 1993 saying he opposed a broad closure effort for DOE's laboratories and the proposed method for addressing opportunities for consolidation and restructuring.

Panel 1

Mr. Galvin testified against the closing of the labs and instead proposed corporatization of the labs. Under his plan the government would continue to own DOE's facilities, but the labs would be overseen by a board of trustees composed of industry and academic leaders. The government would retain title to the sophisticated, complex physical assets of the laboratories and would continue to fund the labs as well as university research at near-current levels. The labs would be operated by the private sector. DOE would remain the sponsor of the labs and the Federal Government would continue to be the labs' principle customer although they would also serve university and corporate clients. Mr. Galvin stated that the simplification would lead to a 75 percent reduction in DOE's lab personnel. He noted that the structure could include the following conditions: DOE will carry out a revised role; the corporation will be subject only to "normal" federal and state control of commercial companies; and the Federal Government will continue to bear preexisting liabilities associated with the labs. Annual reports must document the presence of internal accounting and control systems. Audit reports will be submitted to Congress. The corporation

has the authority to make financial commitments without fiscal year limitations. The corporation will not have to hire people from within the civil service system. A transitional planning mechanism will be put into place.

Mr. Bloch testified that the U.S. government spends too big a portion of the R&D budget on federal labs. He stated that the problem resides with DOE organization, its management style and oppressive controls. Mr. Bloch said the solution lies with reducing bureaucracy, regulations, micro-management from the top, and overhead costs, while focusing on the mission of the laboratories, their programs and projects. He spoke in support of H.R. 2142. In his testimony, Mr. Bloch listed some ground rules for streamlining: (1) DOE and its labs must be considered as a system; (2) DOE missions must be simplified; (3) Goals for downsizing must be clear and time frame mandated; and (4) Congress must refrain from becoming excessively involved in the downsizing effort and, instead, concentrate on policy, goal setting and progress assessment. Turning the DOE into an independent agency, transferring the four science labs to the NSF, and creating a closing commission to eliminate unnecessary and obsolete federal labs and regional offices will help reduce management inefficiencies, overhead, redundant activities, and regulations so that the DOE labs can focus on their core missions.

Dr. Vest testified that the laboratories should pursue work in areas identified as having long term national importance relevant to the DOE mission, and should be allocated through a merit-based competitive process. He stated that the primary role of national laboratories should be to operate unique experimental facilities that are of too large scale, or are too costly to be maintained by individual research institutions outside the federal sector. When thought is given to downsizing, expanding, or changing the mission of existing laboratories, merit-based competition should be introduced. This is likely to lead to establishment of modest-scale laboratories or centers in universities or other performing organizations.

Mr. McCorkle spoke in support of programs which facilitate the commercialization of dual-use technologies originated in the Department of Energy laboratory structure. He also spoke in support of H.R. 2142. He urged caution in the closure of DOE facilities and noted that they comprise the key element of our nation's scientific community, furthering basic research and playing a critical role in national security. He stated that commercialization doesn't replace the government-funded research in the laboratories, but rather enhances the value of the research by creating a "dual benefit." Mr. McCorkle said DOE should continue to develop core competencies and technical capabilities that strategically position them to contribute to the scientific and technological well being of the nation. He stated that this should include a continuation of their current role in national security, and should expand to include a greater contribution to the private sector.

Dr. Smith testified that the reduction of employment called for in H.R. 1510 and H.R. 2142 would have serious effects on the resources which support university scientists. He does not support H.R. 1993 language for directing cuts only toward civilian labora-

tories and activities in part because the defense labs also have non-defense functions which he says, by this logic, should also be cut. Dr. Smith criticizes H.R. 87 for its "unwieldy" process for eventually reaching lab closure and/or reconfiguration. He noted that DOE labs are so diverse in mission and function that a common set of criteria for reviewing and assessing their activities will be difficult to achieve. He spoke against the language in H.R. 2142 calling for an extensive set of criteria to be used in deciding which labs or programs to close or to consolidate. He noted that the publication of criteria in the Federal Register in advance of the decisions may create opportunities for delay, stretching out the process, and legal challenge to the action taken. Dr. Smith criticized H.R. 1993 questioning if the gains are sufficient to outweigh the inevitable confusion, disarray, and wheel-spinning that accompanies a major organizational change.

Panel 2

Dr. Bernthal discussed the importance of strengthening the partnership between the nation's distinguished research universities and its national laboratories. He spoke in favor of H.R. 2142 and he noted that the principles set forth in the bill reflect the conclusions of the Galvin Task Force. Dr. Bernthal testified that the research objectives of the national laboratories should be determined by the marketplace of ideas and the needs of the country. He suggests a corporate-style governing structure be created for DOE's major research laboratories and he said that if "privatization" means selling the laboratories to the highest bidder, then it is a non-starter. It is not clear who would buy the laboratories in an era when industry seems to be systematically reducing in-house research. If, on the other hand, "privatization" means developing an augmented "corporatized" GOCO system, that kind of privatization is appropriate.

Dr. Narath spoke in support of H.R. 2142 and discussed common weakness of H.R. 87 and H.R. 1993 creating a Facilities Commission to review and modify DOE's plan before the Department has demonstrated failure in aligning its laboratory system with its mission responsibilities. Dr. Narath stated that assigning laboratories specific missions may hinder their ability to progress toward becoming an effective system of laboratories. Dr. Narath testified against corporatization stating that it eliminates a linkage between the laboratories and the executive branch encouraging the Department to direct its funds elsewhere. He stated that a Board of Trustees is unlikely to be effective in resource allocation. He is supportive of the GOCO (Government-Owned, Contractor-Operated) model of laboratory management stating that it should be revitalized and restored. Any change to the laboratory system should preserve the joint agency responsibility and accountability for nuclear weapons.

Dr. Olesen stated that increasing economic productivity and enhancing the competitiveness of U.S. industry should not be a core mission of either DOE or the national laboratories. He testified that primary research missions of the national laboratories should be those that are not more effectively conducted by universities or private industry. He also testified that a clear mission focus in each laboratory will improve the performance of the laboratories

both individually and as a system. He stated that DOE's core missions of energy, environment, national security, and fundamental science should be the primary focus of the national laboratories. Dr. Olesen noted that rather than attempting to regulate the size of the work force, the government should hold laboratory management contractors accountable for achieving the scientific results and meeting the technology needs specified by the government. He also recommended revitalization of the GOCO model in contrast to the corporatization and privatization alternatives and stated that the GOCO model is highly effective in meeting government R&D needs.

Dr. King spoke in support of the GOCO model that ensures a greater level of contractor responsibility, autonomy and accountability to enable the national laboratories to fulfill their roles as efficient and cost-effective vehicles in support of national missions. He stated that the role of the DOE national laboratories should be mission-driven, keyed to national needs and issues, and focused on problems whose solutions require multidisciplinary expertise. He spoke in support of HR. 2142 but not H.R. 1510 because of its proposed one-third reduction. He stated that any decisions about the size and scope of the national laboratories should be made only after their missions have been clearly defined.

Panel 3

Dr. Gay fully supports DOE's national laboratory realignment activities. He stated that a comprehensive strategic plan is needed to define laboratory missions and to allocate resources to accomplish these missions. He spoke against privatizing facilities stating that they will not attract sufficient funding to effectively fulfill national missions. He also stated that improving the DOE national laboratory system involves the following steps: establish clear missions; prioritize research tasks and funding; assess core competencies of individual laboratories; assign specific missions; review and redefine governance structure; and define the best DOE oversight and laboratory management structure. NREL supports the "basic thrust" of H.R. 2142. Dr. Gay stated that H.R. 2142's core mission provisions could provide appropriate guidance to a commission which would review and evaluate all pertinent recent studies. In general, Dr. Gay supports H.R. 87 and H.R. 1993 and the formation of an independent commission to make recommendations on reconfiguring and streamlining the DOE laboratory system but he says both bills are too narrowly focused. He also suggested that the bills: seek to facilitate the clear definition of laboratory missions; evaluate prioritization of laboratory work; assess whether current missions are being effectively accomplished; identify unnecessary overlap and application; ascertain whether any laboratories should be consolidated, reduced in size or scope, reconfigured or closed; and determine appropriate staffing levels for individual laboratories. Regarding H.R. 1510, the NREL supports elimination of self-regulation at DOE laboratories.

Dr. Hecker spoke in support of the importance of defining missions for the DOE laboratories. He noted that in addition to a compelling mission, it is imperative that the laboratories demonstrate cost effective operations. He does not favor establishing additional

commissions or conducting more studies of the laboratories, nor does he endorse arbitrary size reduction. He suggests the path outlined in H.R. 2142 to define the missions of the laboratories and then size them accordingly. He noted that three crucial research functions continue to be best performed by the DOE laboratories—nuclear weapons defined broadly, energy and environment, and a sharing of the fundamental research mission with other federal agencies. He noted that mission assignment for the individual laboratories should reflect their scientific and technical core competencies as well as the ability of the laboratory to satisfy specific customer requirements. Dr. Hecker spoke in support of the GOCO system of governance and noted that the system has eroded over time. He suggested the system be rebuilt based on the same fundamental principles.

Dr. Schriesheim testified that the mission of the Department of Energy is clearly stated in its strategic plan. He noted that one of the most important missions for DOE laboratories is the design, construction, and operation of user research facilities. He agreed that DOE improve the coordination of its basic sciences program with its energy technology programs. Dr. Schriesheim spoke in support of greater DOE coordination of basic science programs with energy technology programs and more partnerships with industry. He also supports elimination of self regulation.

Dr. Tarter stated the core mission areas of the DOE national laboratories: national security; energy; environmental science and technology; and underpinning fields of basic science. He testified that each major DOE laboratory needs to have a defining purpose which will cause the laboratories to appropriately "size" themselves as the mission and program definitions are refined, and as the management requirements are restructured. Dr. Tarter supports the GOCO laboratory arrangement and stated that every effort should be made to retain and improve it.

Dr. Trivelpiece expressed concern about lab closures and the private sectors decreased investment in research. He also spoke in support of the GOCO concept.

Dr. Crawford supports R&D partnerships with industry, universities, and other federal laboratories. He testified that realignment of the DOE laboratories is necessary, but should be driven by mission requirements and best business practices. He said that it is unwise to prescribe an explicit size and personnel limitation (as H.R. 1510 would mandate) and to make closure recommendations before missions have been mapped to resources and facilities. He is supportive of H.R. 2142 and concerned that as missions are defined for the laboratories, a trend toward finer and finer differentiation among missions might eventually move the multiprogram laboratory system in the direction of very narrowly defined, single-mission laboratories. Dr. Crawford spoke in support of the GOCO system.

4.2(i)—The National Earthquake Hazards Reduction Program

October 24, 1995

Hearing Volume No. 104-29

Background

On October 24, 1995, the Subcommittee on Basic Research held a hearing entitled, "The National Earthquake Hazards Reduction Program," to evaluate the National Earthquake Hazards Reduction Program. Statistics show that earthquakes kill more people and destroy more property than any other natural disaster. Over the past fifteen years, earthquakes have caused over 100,000 deaths and hundreds of billions of dollars in economic losses worldwide. More catastrophic earthquakes are inevitable. In the United States there is high risk, not just in California, but also in the Pacific Northwest, the Mississippi valley, Alaska, Utah, and New England. Should major earthquakes (above magnitude 7) hit in these regions, projected losses are in the thousands of lives and multiple billions of dollars in damage. Most damage and loss of life from earthquakes results from buildings and other structures that fail during and after the shocks. Because much of the loss to life and economy can be prevented or reduced through promulgation of adequate zoning and building codes and prompt response, Congress established the National Earthquake Hazards Reduction Program (NEHRP) in 1977. Since its inception, NEHRP has focused on earthquake research (physical, seismic, structural, and social) as well as earthquake hazards mitigation. These programs are executed by four federal agencies: The National Science Foundation (NSF); the United States Geological Survey (USGS); the National Institutes of Standards and Technology (NIST); and the Federal Emergency Management Agency (FEMA). The purpose of the hearing was to assess the current status of the Federal Government's earthquake research and earthquake hazards mitigation efforts prior to consideration of reauthorization of NEHRP which expires at the end of 1996.

Witnesses included: Dr. Paul Komor, former Project Director of the report "Reducing Earthquake Losses" at the Office of Technology Assessment (OTA); Dr. Daniel P. Abrams, Professor of Civil Engineering, University of Illinois; Mr. Richard T. Moore, Associate Director for Mitigation for the Federal Emergency Management Agency (FEMA); Dr. Robert M. Hamilton, Program Coordinator for Geological Hazards for the U.S. Geological Survey (USGS); Dr. Joseph Bordogna, Assistant Director for Engineering for the National Science Foundation (NSF); Mr. Richard N. Wright, Director of the Building and Fire Research Laboratory for the National Institute of Standards and Technology (NIST); Dr. Paul Somerville, Seismologist at Woodward-Clyde Federal Services; Dr. Thomas Jordan, Chair of the Department of Earth Sciences at the Massachusetts Institute of Technology (MIT); Dr. Thomas Anderson of the Fluor Daniel Corporation, representing the NEHRP Coalition; and, Dr. Anne Kiremidjian from the Department of Civil Engineering of Stanford University.

Summary of hearing

Dr. Komor testified that greater use of existing knowledge gained through NEHRP would reduce losses significantly. He expressed concern that NEHRP, in its current form, will not significantly reduce earthquake risks due to a failure to implement known practices and technologies. Dr. Komor discussed NEHRP's lack of clear and workable goals and strategies. During his testimony he noted OTA's identification of several policy changes NEHRP could make to yield major national reductions in earthquake losses. Such changes cited were: changes in the specific research activities NEHRP undertakes; changes in NEHRP's management and operations; and changes to federal disaster assistance and insurance, regulation, and financial incentives.

Dr. Abrams testified that experimental research programs must be pursued at an accelerated rate to advance the state-of-the-art in seismic engineering and construction practices, enhance public safety, and reduce economic losses in future earthquakes. He said that the highest priority at the earthquake engineering community is that existing laboratory engineering testing facilities be upgraded and modernized with new equipment. He noted that existing cooperative research programs with other countries should be continued, and new programs should be established where the sharing of testing facilities and the exchange of data and research results is mutually advantageous.

Mr. Moore assured the Subcommittee that the Administration is addressing concerns raised in the past about NEHRP, including the lack of an overall strategic plan and insufficient coordination among the agencies. He also discussed FEMA's role in NEHRP, including the responsibility of training architects and engineers, efforts supporting hazards identification and loss estimation techniques, the adoption and enforcement of seismic codes, response and recovery planning, and education and public awareness.

Dr. Hamilton stated that the role of the USGS is to assess earthquake hazards, including understanding the cause of earthquakes and the nature of their effects. Dr. Hamilton remarked that some of USGS's research is being brought to bear on local mitigation decisions, however he conceded dissatisfaction with the pace of implementation with in NEHRP.

Dr. Bordogna discussed NSF's contribution to NEHRP through the funding of research in the disciplines of earth science, earthquake engineering, and social sciences and integrated multidisciplinary research. He also discussed the fundamental research supported by NSF and performed by non-government persons and groups. He noted that NSF enables researchers to advance knowledge through both individual investigator awards as well as group awards such as those the National Center for Earthquake Engineering Research at the State University of New York at Buffalo.

Mr. Wright described NIST's responsibility in NEHRP to conduct problem-focused research and development to improve standards and codes and practices for buildings and lifelines. He also noted NEHRP's effectiveness in reducing losses through the improved performance of buildings and bridges built using up-to-date design and construction practices. Mr. Wright agreed with Dr. Hamilton that there is a knowledge gap as well as an implementation gap

within NEHRP. He also noted that reducing structural damages requires that the owner of the facility be willing to invest additional money, not required by the state or local building codes.

Dr. Somerville disagrees that the resources committed to earthquake risk reduction in the United States are commensurate with the high risk to life and economic health. He stated that the best way to achieve results is to introduce legislation that mandates or provides financial incentives for the adoption of codes and the implementation of mitigation measures.

Dr. Jordan stated that the most effective foundation for continued national efforts in earthquake hazard reduction is a vigorous federally-funded and coordinated program of basic and applied research directed towards a better understanding of earthquakes and earthquake related damage. He also expressed the need for more centers like the Southern California Earthquake Center (SCEC), which undertakes the construction of regional seismic hazard maps, formulation of realistic earthquake scenarios, and processing of real time earthquake information. Dr. Jordan also highlighted the present and future importance of the global positioning system to earthquake hazard mitigation.

Dr. Anderson testified that incentives are required to implement new mitigation technology. He assured the Subcommittee that the priorities for action for the future of revitalized NEHRP are incentives, program management, and technical issues. He noted that because NEHRP and its four program agencies do not have the authority to establish and enforce implementation regulations, it becomes the responsibility of Congress either to establish federal implementation regulations or financial incentives or both.

Dr. Kiremidjian testified that NEHRP has made some very significant and very important advances in the effort toward earthquake hazards reduction. She stated that the advances have been both in research and implementation. She also criticized the deterioration of the laboratories and note that much of the laboratory equipment is outdated and obsolete.

4.2(j)—The High Performance Computing and Communications Program

October 31, 1995

Hearing Volume No. 104-32

Background

On October 31, 1995, the Subcommittee on Basic Research held a hearing entitled, "The High Performance Computing and Communications Program," to examine the High Performance Computing and Communications Program (HPCC). The High Performance Computing and Communications Act of 1991 authorizes a multi-agency R&D program to: (1) develop technologies needed for high speed data networking and to provide network access for the research and education communities; (2) support development of advanced software technology for application to important problems in science and engineering (Grand Challenges); (3) stimulate development of a new generation of high performance computing sys-

tems; and (4) support basic research and human resources development in computer and computational sciences. The HPCC Program plan was expanded in FY 1995 to include an additional component to develop the technology base underlying and advanced information infrastructure and use this technology to develop and demonstrate applications of national importance, such as education and health care delivery.

Witnesses included: Mr. John Toole, Director of the National Coordination Office for High Performance Computing and Communications; Dr. Anita Jones, Chair, Committee on Information and Communications (CIC), National Science and Technology Council; Dr. Ivan Sutherland, Co-Chair of the National Research Council's (NRC) Committee to Study High Performance Computing and Communications; Dr. John D. Ingram, Research Fellow, Schlumberger; Dr. Edward Lazowska, Chair, Government Affairs Committee, Computing Research Association (CRA); Dr. Forest Baskett, representing the Computer Systems Policy Project; and, Dr. Jermiah Ostriker, Provost, Princeton University.

Summary of hearing

Mr. Toole testified that the HPCC Program has been a model "virtual agency" and is responsible for maintaining long term computer science research and supporting the mission needs of the agencies involved in the program. Mr. Toole gave examples of advancements in computational modeling which have been beneficial to fields such as aerospace, astronomy, meteorology, medicine, and education. He believes that sustained long term government investment is essential for the nation. Mr. Toole feels that the HPCC Program does not necessarily need to be reauthorized, but would rather see Congress support and fund HPCC activities through the respective agencies.

Dr. Jones testified that in order for the United States to maintain its dominance in high performance information technology, the Federal Government must make the early long-term investment in research, not industry—which is interested in profit. Further, she stated that long-term research has become more competitive, citing Japan's emergence in high performance computing. She then testified that the CIC outlined broad areas for future investment. Dr. Jones cited many examples of how the HPCC Program assists the mission responsibilities of participating federal agencies, primarily through software tools and techniques developed from HPCC research. Dr. Jones advocated authorization of HPCC programs through the participating federal agencies and not a reauthorization of the HPCC Program as a whole, emphasizing the need for continued federal investment.

Dr. Sutherland emphasized two recommendations of the NRC report: (1) to continue support for research in information technology, especially through agencies such as the National Science Foundation and the Advanced Research Projects Agency; and (2) to continue the HPCCI to meet challenges posed by the nation's evolving information infrastructure. Dr. Sutherland stated that the United States must have the knowledge to best utilize information technology to achieve maximum advantage and that effort is greatly assisted by federal support for long term research. He also pointed

out that many "unanticipated benefits" have come from HPCCI research and that other nations realize the advantages in investing in long term technology research. Dr. Sutherland feels that the HPCC Program is best served by having a coordinator, like Mr. Toole, rather than an administrator dictating direction.

Dr. Ingram testified to the Subcommittee that industry views research investment in terms of "risk vs. return," stating that each industry has its own agenda, and only a program like the HPCC Program can insure quality research in key areas and that cooperative programs including government, academia, and industry are the most efficient way to achieve practical implementations of research. With limited funds, Dr. Ingram stressed the need in setting priorities for research and to leverage those funds with joint efforts with other countries.

Dr. Lazowska testified that the United States has benefited immensely from its leadership in information technology and that the CRA supports an HPCC Program reauthorization which is flexible enough to allow the program to adapt quickly to new research opportunities. He emphasized the importance of university research in advancing basic research. Dr. Lazowska then reviewed HPCC Program accomplishments in parallel computing and the growth of the Internet.

Dr. Baskett testified that the HPCC Program has helped the United States maintain its lead in information technology and without the program long range research would be neglected by industry due to the competitive nature of the market. He stated that industry is not looking for federal support of their internal R&D programs: the federal grants and contracts process is too slow for industry. Federal support of fundamental research has allowed U.S. industry to remain at the forefront of technology in a time of increasing global competition, according to Dr. Baskett, and the Federal Government can effectively stimulate work among government, industry, and academia.

Dr. Ostriker briefed members on advances in supercomputing over the past three decades in 3-D simulation/problem solving and picture resolution. He detailed how high performance computing has allowed researchers to calculate the consequences of known laws and theories of science which was not previously possible.

4.2(k)—Department of Energy (DOE) National Laboratory Restructuring

November 9, 1995

104-34

Background

On November 9, 1995, the Subcommittee on Basic Research held a hearing entitled, "Department of Energy (DOE) National Laboratory Restructuring," concerning the restructuring of the Department of Energy's National Laboratories. The hearing focused on H.R. 884, a bill to authorize federal funding of retirement incentives for certain lab employees, to match those offered by the labs' university contractor, within the broader context of DOE's overall

workforce restructuring, strategic realignment and downsizing. The Subcommittee also considered H.R. 2301, a bill to designate an enclosed area of the Oak Ridge National Laboratory in Oak Ridge, TN as the "Marilyn Lloyd Environmental, Life and Social Sciences Complex."

Witnesses included: The Honorable Bill Richardson (D, NM-3); Mr. Robert R. Nordhaus, General Counsel, U.S. Department of Energy; Mr. James Phillips, Executive Director, Labor Relations, University of California; Mr. Charles Meier, Employee of Lawrence Livermore National Laboratory; Mr. Thomas Sandford, Employee of Los Alamos National Laboratory.

Summary of hearing

Panel 1

Congressman Richardson, author of H.R. 884, explained the rationale behind his legislation and outlined the series of changes to lab retirement programs that led him to draft the bill. He stated that prior to October 1, 1961, all employees of Los Alamos (LANL), Lawrence Livermore (LLNL) and Lawrence Berkeley (LBL) national labs were enrolled in the California Public Employees Retirement System (California PERS). On October 1, 1961, the University of California (UC), who administers the labs, established its own retirement program—the University of California Retirement Program (UCRP)—all employees hired after the establishment of UCRP were part of the program. In 1993, simultaneous to new DOE downsizing/restructuring initiatives, UC implemented the Voluntary Early Retirement Incentive Program (VERIP) III, which offered benefits—including an added three years to retirement age, three years service credit, and three months pay—to its UCRP members. No such incentives were offered to California PERS members, even though they had worked for the labs for over 30 years. Mr. Richardson stated that his bill "is intended to offer a fair retirement incentive to . . . some 450 men and women . . . who were denied the opportunity to participate in a similar program." He also emphasized that ". . . these employees were wrongly overlooked . . ." and that UC's decision unfairly discriminated against some of the labs' most senior employees.

Panel 2

Mr. Nordhaus prefaced his remarks about H.R. 884 with a general discussion of DOE's formal Department-wide restructuring plans, which began in 1993. He explained that section 3161 of the National Defense Authorization Act for Fiscal Year 1993 established a framework for workforce restructuring, mandating that the Secretary of Energy develop restructuring plans which include mechanisms for working with collective bargaining and community groups, and state and local governments, and establish rehire networks to avert or minimize negative socio-economic effects at various defense nuclear sites, including the labs. To date, DOE has prepared 20 restructuring plans at thirteen defense nuclear sites, including Los Alamos, with future plans for Lawrence Berkeley and various non-defense sites. Of the approximately 24,000 DOE and subcontracted employees who have been eliminated, over 75% have

left voluntarily. Specific to H.R. 884, Mr. Nordhaus stated that VERIP III was the third UC workforce restructuring since 1991, and in 1991, UC offered similar retirement plans to lab employees in UCRP and PERS. He continued that although lab employees "perceive an inequity," VERIP III had nothing to do with any DOE plan and explained that UCRP and PERS have nothing to do with each other—they are separately administered and financed. He maintained that not only would federally mandating and/or funding a program to match a private program set a bad precedent, but that California PERS members—along with the rest of the state's federal employees—are under the jurisdiction of the California Assembly, who has voted down such changes twice in the past. He concluded that if such legislation passed, DOE would support it. He also voiced the DOE's support for H.R. 2301.

Mr. Phillips focused his testimony on the differences between PERS and UCRP, noting different, yet comparable benefit packages. He explained that PERS members had the opportunity to join UCRP when the program was initiated, but many did not because of various factors. He explained that VERIP III was initiated because of UC budget constraints. At an estimated cost of an additional $35 million, UC was precluded from funding such an offer to PERS lab employees; and PERS lab employees are part of the full, state employee pool, which cannot afford such adjustments either. Two funding options for H.R. 884 exist: additional federal appropriation; or payment from existing lab budgets, which would necessitate cuts in lab functions/workforce.

Panel 3

Mr. Meier provided the view of the 438 California PERS members who were not offered the benefits of their UCRP counterparts. He stated that VERIP III "is the first time the DOE and the University have departed" from equal retirement incentives and emphasized that the employees' complaint is "parity in retirement *incentives* . . . not in retirement benefits." Moreover, despite UC's and DOE's arguments to the contrary, a "PERS VERIP" is very doable. He explained that DOE exempted UC from formal restructuring review mandated by the FY93 Defense Authorization, at the insistence of UC, despite lack of exemption provisions. He asserted that had such a review been conducted, a wholly different early retirement plan might have been implemented. Although DOE and UC have privately admitted that PERS employees have been treated unfairly, they nonetheless maintain that a PERS VERIP is too costly. From a fiscal standpoint, however, Mr. Meier stated that the UCRP pension surplus saved DOE $140 million annually in its UCRP employer contributions; and, in FY94, DOE spent only $108 million of its $200 million allocated for lab restructuring—money that could have been spent to fund a PERS VERIP. Further, upfront incentive costs would be recovered within eighteen months and additional money saved through eventual employer contribution and salary savings. Mr. Meier concluded that, "H.R. presents an opportunity to both right an injustice and implement a savings to the government."

Mr. Sandford repeated the concerns of Mr. Meier, reemphasizing the fact that had section 3161 been followed, as it has been at

many other contracted-lab facilities, the current inequities might have been avoided. He stated that the lack of restructuring funds at the UC-contracted labs is "a glaring omission." Further, PERS and UCRP employees had always been treated equally in the past. He stated that the only conclusion he and his colleagues can draw is since "our numbers were so few . . . the University of California felt free to take the PERS employees' situation lightly." He called such a decision a "bad business decision" that was unfair and not cost-effective given the University's and DOE's ability to make up the cost in eighteen months.

4.2(l)—Partnership For Advanced Computational Infrastructure Program

March 19, 1996

Hearing Volume No. 104-47

Background

On March 19, 1996, the Subcommittee on Basic Research held an oversight hearing entitled, "Partnership For Advanced Computational Infrastructure Program," to examine the accomplishments of the NSF's Supercomputing Centers Program over the last ten years and evaluate the solicitation of the National Science Foundation's (NSF) Partnership for Advanced Computational Infrastructure.

Witnesses appeared in three panels. The first panel included: Dr. Paul Young, Assistant Director for Computational and Information Science and Engineering, National Science Foundation (NSF), and Dr. Edward Hayes, Chairman, Report on the Task Force on the Future of NSF Supercomputing Centers Program, and Vice President for Research, Ohio State University.

The second panel consisted of NSF Supercomputing Center Directors: Dr. Malvin Kalos, Director, Cornell Theory Center, and Professor of Physics, Cornell University; Dr. Larry Smarr, Director, National Center for Supercomputing Applications, and Professor of Physics and Astronomy, University of Illinois at Urbana-Champaign; Dr. Ralph Roskies, Scientific Director, Pittsburgh Supercomputing Center, and Professor of Physics, University of Pittsburgh; and Dr. Douglas Pewitt, Acting Director, San Diego Supercomputing Center.

Panel three featured members of the user community and included: Dr. Mary Vernon, Department of Computer Sciences and Engineering, University of Washington, Seattle; Dr. Kelvin Droegemeier, School of Meteorology and Center for Analysis and Prediction of Storms, University of Oklahoma; and Dr. Douglas Gale, Assistant Vice President for Information Systems and Services, the George Washington University.

Summary of hearing

Panel 1

Dr. Young explained that NSF has considered the needs of the user community, as well as the scientific needs of the nation, in deciding to go forth with the Partnership for Advanced Computa-

tional Infrastructure Program. The Supercomputing Centers Program was created in response to the research and education communities' need for high quality science and engineering and has already far exceeded the original goal during its first ten years. Dr. Young emphasized the program's new structure will capitalize on technical and budget realities with the ultimate aim being a more powerful and improved program with computational science and engineering ability distributed more broadly across the country. According to Dr. Young, the envisioned structure makes sense independently of the actual number of centers and partnerships. He explained that under the new structure, the program will operate fewer high-end leading centers, but overall will have more full partners and greater efficiency in the program.

Dr. Young stated NSF believes that networking technology and the advent of scalable mid-level parallel machines that scale up to the high end, will yield a program which includes a broader distribution of the technology across the country, more participating centers, better integration of mid-level systems and better use of high-speed networking connections. He assured Members that NSF is not bound by the federal procurement process and has cooperative agreements with industry to test and develop software and machines. Dr. Young explained that the Supercomputer Centers Program has been successful as a result of the competing programs that have learned to work in a cooperative fashion. Dr. Young explained NSF's management intent is to continue that cooperation among leading-edge sites. Dr. Young pointed out that NSF's policy and procedure has been one of fair, open competition and peer review to bring out new ideas and utilization of the best expertise in industry, academia, and government to review proposals for better use of existing technologies through the competition. He promised NSF will make every effort to maintain quality service to the research community during transition to the new program.

Dr. Hayes testified on the conclusions and recommendations of the Task Force report. Dr. Hayes explained the Task Force's approval of NSF's progress on setting future direction for the Supercomputing Centers Program. He stressed the Program's importance as a critical component of the strong U.S. position in science and technology and acknowledged the importance of partnerships between the Centers and the vendors as the key to its success. Dr. Hayes pointed out that although the Task Force began with the work of earlier reports, they did not accept the conclusions of the recommendations uncritically. They sought input from the community, including several key NSF advisory committees, on the benefits of the current program to develop their own analysis which focused on the merit review process for allocating resources at the current centers as well as the educational benefits of the Program.

According to Dr. Hayes, recommendations of the Task Force are derived from their vision for the future which includes a strong coupling of selected research centers and university laboratories with the leading-edge sites that have the highest-end computational systems and will provide future potential in terms of enhanced program flexibility, creativity and efficiency. In addition, Dr. Hayes explained the balanced program should include a number of mid-range centers that could be formally coupled into the

program to provide increased efficiency and creativity. In addition, Dr. Hayes highlighted two recommendations central to the new Partnership Program: First, NSF should support a few leading edge sites which will have a balanced set of high-end hardware capabilities, coupled with appropriate staff and software. Second, partnership sites should provide better coupling to computer scientists developing new tools and software. Dr. Hayes explained that the Task Force considered the overall program, as well as advice from the Foundation and their own sense of the budget environment, in considering whether NSF may have to downsize the total number of partnership sites to achieve a balanced program. Dr. Hayes explained that NSF's challenge is to keep the playing field level to permit an appropriate level of competition, while bringing out creativity.

Panel 2

Dr. Kalos stated computational science is now an essential tool in experimental science contributing to the design, study, optimization, and verification of the most advanced scientific instruments. According to Dr. Kalos, computation as an aid to understanding and the predesign of costly experiments, is an important way to use limited budgets in an optimum way. According to Dr. Kalos, the 512-processor SP at Cornell is one of the most powerful computing environments available today. He believes that the Cornell Center has also made a singularly important contribution to the national scientific effort by the depth and quality of their partnership with IBM. Dr. Kalos emphasized the Center has begun taking delivery of the new IBM machines that scale in size, memory and computing power so that some of the advance in technology does not require completely replacing the machine. Examples that illustrate the scope and influence of the Cornell program include analysis, simulations and modeling in areas of molecular biology, astrophysics and fusion energy. Although the Supercomputing Centers are presently focused on the recompetition, in the long term Dr. Kalos is certain that the inter-center cooperation will re-establish itself. Dr. Kalos stated the allocation of access to the Cornell Supercomputer is governed by a national allocation policy and judgments are entirely on the basis of the scientific merit of the research and the balance of resources required to do the research.

Dr. Smarr stated the Supercomputing Centers have evolved and their role within the national program has changed dramatically. He noted the solicitation is not new; it grew out of the successes and maturation of the original Center concept. In addition, Dr. Smarr indicated the notion that a Center being in one geographical location is becoming an anachronism. Dr. Smarr explained one of the major changes in supercomputer design is the transition from building a processor unique to each supercomputer, to installation of microprocessors "sewn together" to construct supercomputers. As a result, capitol costs have been cut significantly and additional spending is allocated for memory instead of processors. In terms of those Centers that will be phased-out as a result of the recompetition, Dr. Smarr believes that a process similar to that of five years ago will occur, and NSF will allow for an efficient phase-out where users are transferred to other centers and staff is easily transferred

to other centers or industry. In addition, Dr. Smarr indicated that Supercomputing centers modeled on the NSF Supercomputing Centers Program are present in a dozen countries.

Dr. Roskies highlighted a few examples of enhanced quality of life made possible by application of high performance computing at the Pittsburgh Center, including a better understanding of the generation of smog over Los Angeles, accurate predictions of the course of severe thunderstorms six hours ahead of time, simulation of a functioning heart, and improving and extending the reach of electronic networks. Dr. Roskies emphasized one of the great strengths of the NSF's Supercomputing Program has been the diversity of different Centers' approaches. Dr. Roskies explained the brief interruption in the cooperation among the centers during the recompetition will have to be viewed as a fact of life for the next eighteen months.

Dr. Pewitt emphasized the NSF Supercomputing Centers Program continues to be a wise investment for the country. According to Dr. Pewitt, competition is the only way yet proven to ensure continuation of a vigorous U.S. supercomputing program. Dr. Pewitt stated, "if you don't compete, you lose vigor" and "the only way to maintain vigor in the program is to have periodic competitions." He believes the solicitation should result in a program more inclusive of organizations with diverse and complementary strengths and provide a stronger infrastructure that can help the nation maintain scientific leadership and economic competitiveness. Dr. Pewitt urges assurance of a level playing field for private industry participation in the solicitation.

Panel 3

Dr. Vernon testified in strong support of the restructuring of the NSF Supercomputers Program to create the Partnership for Advanced Computational Infrastructure Program. According to Dr. Vernon, the program will be significantly strengthened by the proposed restructuring to include leading-edge sites partnered with experimental facilities and research centers at other universities, as well as other national and regional high-performance computing centers. Dr. Vernon stated the planned NSF review process is the appropriate mechanism for determining the specific number and types of partnerships that will best meet the needs of computational science and engineering in the next decade. She indicated a reduction in the total number of leading-edge sites is possible and necessary given the requirement that leading edge centers provide balanced computing capabilities which are one to two orders of magnitude beyond what is available at leading research universities.

Dr. Vernon believes recompeting the centers is the best approach to achieving the most effective leading-edge sites and partnerships. According to Dr. Vernon, members of the broad scientific and engineering community, following the merit review process and criteria outlined in the program solicitation, will make wise choices for the Nation. She stated, "the review panel members will fully understand the intricacies of the new directions and will best be able to judge the number and combination of proposed partnership sites

that will best serve computational science and engineering and the national interest in the next decade."

Dr. Droegemeier shared his thoughts regarding the recompetition of the NSF Supercomputer Centers and highlighted a successful four-year partnership between the Center for Analysis and Prediction of Storms and the Pittsburgh Supercomputing Center. According to Dr. Droegemeier, the ability of his science and technology center to accomplish its mission depends critically upon access to and the effective use of high-performance computing and telecommunications systems. By working with the Pittsburgh Center, the Center for Analysis and Prediction of Storms has been able to prototype various computational strategies and techniques for operational storm scale prediction that can be considered by the National Weather Service (NWS) for implementation early in the next century. Dr. Droegemeier believes the concept for the recompetition is good, but warned that care should be taken in evolving the new infrastructure to avoid a reduction in overall resources available to the national community and a potential elimination of diversity that exists among the current centers.

Dr. Gale commended the accomplishments of NSF's Supercomputing Centers Program and offered his assessment of the recompetition solicitation. Dr. Gale cited the simulation of crash results at the National Crash Analysis Center at George Washington University to illustrate how NSF initiatives have contributed practical benefits. According to Dr. Gale, the National Crash Analysis Center, which simulates automobile crashes to improve the safety of vehicles and roadside objects, is supported and widely used by the automotive industry. According to Dr. Gale, while there are concerns within the user community about amounts available and possible changes in existing funding for individual projects, general widespread enthusiasm exists for the opportunity to explore new ideas, collaborations, and partnerships. Dr. Gale believes although there may be some consolidation of the leading-edge centers, the solicitation is worded in such a way that there will actually be more partnerships and a greater distribution of resources than currently exists. In addition, Dr. Gale believes the NSF peer review process is both fair and insightful and will be effective in distributing resources to those projects that offer the greatest potential.

4.2(m)—National Science Foundation Fiscal Year 1997 Authorization

March 22, 1996

Hearing Volume No. 104-45

Background

On March 22, 1996, the Subcommittee on Basic Research held a hearing entitled, "National Science Foundation Fiscal Year 1997 Authorization," to reauthorize funding for the National Science Foundation (NSF) for FY97. NSF is an independent federal agency founded in 1950 to promote and advance scientific progress in the United States. NSF builds U.S. scientific strength by funding research and education activities in all fields of science and engineer-

ing at more than 2,000 colleges, universities and research institutions across the country. The NSF budget comprised only about 3% of the federal R&D budget of $70 billion in FY95. This notwithstanding, NSF provides approximately 25% of basic research funding at universities and over 50% of the federal funding for basic research in certain fields of science, including math and computer sciences, environmental sciences, and the social sciences. Moreover, NSF plays an important role in pre-college and undergraduate science and mathematics education through programs of model curriculum development, teacher preparation and enhancement, and informal science education. NSF's five-year authorization (P.L. 100-570) expired at the end of FY93. Dr. Neal Lane, Administrator of the National Science Foundation (NSF), testified.

Summary of hearing

Dr. Lane testified that now is the "golden age" for breakthroughs across all fields of science which have direct, beneficial applications across the private sector. He defended the President's FY97 budget request of $3.325 billion, 4.6% above the 1996 conference level, as making a "strong commitment to the NSF and to science." Dr. Lane emphasized that this budget reflects a clear prioritization of NSF programs and laid out NSF's strategic plan, which focuses on four major areas: (1) maintaining balanced support for programs across all fields of science and engineering; (2) maintaining NSF's long-term commitment to world-class projects such as optical and radio telescopes, particle accelerators, Antarctic research, LIGO, the Research Fleet, etc.; (3) promoting interdisciplinary work between pure research and education; and (4) promoting partnerships among individuals, colleges and universities, industry and government. He also stated that NSF has made tough choices required by a balanced budget, noting that the FY97 budget reduces and transfers the $100 million Academic Research Infrastructure Program to the Research and Related Activities Account, and that a mere 4% of NSF's budget is allotted for administration, overhead, etc.

4.2(n)—Government-University-Industry Collaboration: The Future of U.S. Research and Development

June 7, 1996

Background

On June 7, 1996, the Subcommittee on Basic Research held a site discussion in Albuquerque, NM, to review research and development collaborations among the Department of Energy (DOE) national laboratories, research universities, and industry. Due to increasing pressure from enormous budget deficits, the Federal Government has reduced annual research and development spending (in inflation-adjusted dollars), terminated programs, and downsized science and technology-related activities, forcing research and development to share the burden of balancing the budget. In response to increased competition from emerging, aggressive economies overseas, U.S. industry has also recently reduced its investment in basic research, shifting its emphasis to applied research and technology development. All of these trends potentially impact the na-

tion's ability to maintain preeminence in science and technology. One strategy to maximize the impacts of federal dollars is to seek collaborative opportunities between the research and development community. A number of reports have been issued recently that discuss such collaboration including, the Galvin Task Force report on "Alternative Futures for the Department of Energy National Laboratories;" the National Academy of Science's report on "Allocating Federal Funds for Science and Technology;" and the private sector Council on Competitiveness' report entitled, "Endless Frontier, Limited Resources." The Subcommittees on Basic Research and Energy and Environment have also held hearings on these and related subjects during the 104th Congress.

Participants in the site discussion included: Dr. Danny Hartley, Vice President of Laboratory Development at Sandia National Laboratories; Dr. Edward Walter, Industry/Laboratory Liaison for the University of New Mexico; Mr. Sherman McCorkle, President of Technology Ventures Corporation; Mr. Joe Evans, President of Radiant Technologies; and Mr. Graham Alcott, External Programs Director for Intel Corporation.

Summary of discussion

Dr. Danny Hartley stated that as R&D budgets in industry and government decrease, partnerships are essential to the national laboratories' ability to accomplish their missions. Dr. Hartley said that Cooperative Research and Development Agreements (CRADAs) have become the most common arrangement for cooperative research at the laboratories. He also said that such work is cost-shared with the partner, and intellectual property resulting from the collaborative work can be protected, which in turn can be economically beneficial for the labs.

Dr. Edward Walters discussed the role of universities in research and development relationships between universities, industries and federal laboratories, as having the responsibility to lay the conceptual basis for intellectual advances and to conduct fundamental research. He spoke about the challenges in the development of collaborations and partnerships including the differences in missions and cultures, the way that information is disseminated, intellectual property ownership, yearly financial schedules, and management style. He also listed the benefits universities receive from partnerships including funding, exposure, equipment, and educational opportunities such as internships. Dr. Walters stated that the Federal Government can assist with these partnerships by ridding the process of excessive regulations.

Mr. Sherman McCorkle said that in order for DOE to expand its efforts to commercialize laboratory activities as Congress has directed, it is vital for them to form partnerships. He stated that commercialization of such technologies will provide financial returns to the national laboratories by supporting activities that would otherwise have to be funded by the taxpayer. Mr. McCorkle complimented DOE's laboratories for increasing the patenting of their technologies and for transferring those technologies, through licenses, to the private sector. Mr. McCorkle criticized the licensing process as too costly and time-consuming. Mr. McCorkle suggested that in order to maximize the return on taxpayer investment by

commercializing laboratory technologies, steps should be taken to reduce red tape and shorten procedures. These actions will encourage, not deter, the private sector to collaborate with the laboratories.

Mr. Joe Evans described Radiant Technologies' CRADA with Sandia National Laboratories as one where the relationship has been beneficial to both parties. He also stated that Sandia will receive royalties if the technology is commercially successful. Mr. Evans noted that much of the work his company did with Sandia has been published and several key patents have been applied for jointly by Sandia and Radiant. Mr. Evans noted that collaborative efforts can work well, but not if they are used by the commercial partner to conduct basic research. He said there must be a market focus on the part of the commercial partner. Mr. Evans suggested that the role of the national laboratories in the partnership should be the use the of laboratories' unique talents to do what has not been done before.

Mr. Graham Alcott discussed Intel's preferred approach to emphasize collaborations between government, universities and industry. He stated that the results of these collaborations have exceeded their expectations. Mr. Alcott said that to partially address the research gap issue, industry is proposing the formation of five "Focus Centers" to address applied research for the main thrusts outlined in the "National Technology Roadmaps for Semiconductors." Each center would be integrated into the present university infrastructure and would exist synergistically with government sponsored basic research. Although Mr. Alcott complimented the current process of cooperation, he did list areas for improvement including the speed of DOE approvals and an increase in government spending for basic research with industry and university participation in setting the strategy.

The record of this meeting will not be published.

4.2(o)—The Use of Educational Technology and Human Resource Programs to Enhance Science, Math and Technology Literacy

July 7, 1996

Background

On July 7, 1996, the Subcommittee on Basic Research conducted a site discussion at Calhoun Community College in Huntsville, Alabama concerning the use of educational technology and human resource programs to increase math, science and technology literacy, with an emphasis on such programs in Alabama. Members of the panel were drawn from fields and programs that have introduced kindergarten through college-level students and teachers to supercomputing, collaborative/interactive research projects, on-line resources, etc. in order to generate enthusiasm for science and technology in the classroom.

Witnesses were divided into two panels. Panel one included: Ms. Edna Gentry, Alabama Supercomputing Authority (ASA)/Alabama Supercomputing Program to Inspire Computational Science and Research in Education (ASPIRE); Dr. Tommie Blackwell, Director of Education, U.S. Space and Rocket Center, GLOBE/Spacelink

Programs; Dr. Luther Williams, Assistant Director of Education and Human Resources, NSF; and, Ms. Keri Kolumbus, ASPIRE College Student.

Panel two included: Ms. Niki Daniel, Student, University of Alabama at Huntsville (UAH); Dr. Jerry Shipman, Professor and Chairman of the Department of Mathematics, Alabama Agricultural and Mechanical University; Mr. Paul Thomas, professor, Calhoun Community College and NASA Community College Enrichment Programs (CCEP) Fellow.

Summary of meeting

Panel 1

Ms. Gentry described ASA, the first state-funded supercomputer network for use by universities and industry, and ASPIRE, ASA's program that introduces pre-college students to supercomputers and focuses on "scientific exploration." Ms. Gentry stated that effectively utilizing and providing hands-on access to resources like the Internet is key to motivating students in math and science. Essential to teaching the student, however, is first training the teacher. ASPIRE, therefore, provides a "total support environment for the teacher" through: (1) intensive summer institutes which teach the scientific method and how to use computers/the Internet as tools; (2) providing specific curricula and teaching materials; and (3) supplying support through follow-up workshops and regional training centers. ASPIRE focuses on reaching students who are less-interested in math and science, as well as groups who are underrepresented in the scientific community—women, minorities and the economically disadvantaged.

Dr. Blackwell explained that GLOBE is a program hosted by the National Oceanic and Atmospheric Administration (NOAA) and supported by NASA, NSF and the Environmental Protection Agency (EPA). The program offers students (K-12) in the United States and 36 other nations the opportunity to observe, collect, and report scientific environmental data through a central compilation center on the Internet. The data is subsequently interpreted by professional scientists in various climate studies. Participating schools have invested in computer equipment and tailored classes to incorporate the project. Dr. Blackwell stated that GLOBE is "extremely exciting to young people and to teachers who now understand that hands-on, meaningful involvement is the best, most dynamic way to teach math and science." Similar to GLOBE, NASA Spacelink is a comprehensive information and support network which includes lesson plans, teacher aids, software, etc. related to space and aeronautics research.

Dr. Williams stated that NSF is the federal agency responsible for maintaining excellence in science and engineering research and education. He remarked that "support for our education and research system is vital to our economic and technological leadership, to our national security, and to our health and quality of life." He emphasized the importance of basic science and math as an educational component because of the pervasive nature of science in all aspects of modern life. To address this, Dr. Williams said, "it is clear that we need a general rebuilding, starting at the bottom. We

need better basic instruction in grade schools, more challenging undergraduate programs, and better support for graduate education as well." Therefore, NSF is promoting a set of systemic inquiry-based reform initiatives, establishing basic standards at all grade levels, and administering broad programs for local, urban, and rural school systems, as well as specific science and math initiatives at individual schools nationwide. Dr. Williams continued that NSF seeks to promote its mission in the most effective way possible by awarding grants on a merit-based, external peer-review basis, designing programs to integrate education with advancing research, and leveraging proportionately large amounts of outside resources in cost-sharing programs. Such programs reach millions of students and hundreds of teachers a year.

Ms. Kolumbus outlined the role of the ASPIRE program in her high school and college career. Ms. Kolumbus stated that she entered high school as an "average student with not much confidence in [her] scholastic abilities." A typing/beginning computer class piqued her interest in computers, and she enrolled in an upper-level, ASPIRE-sponsored class where she was introduced to the Internet, college computer facilities, and advanced research projects and competitions. Ms. Kolumbus emphasized that ASPIRE not only provided computer opportunities, but developed her public speaking, writing, research and presentation skills. She is an honors Computer Science major at the College of Engineering at the University of Alabama at Tuscaloosa, with minors in Public Speaking and Mathematics. She credits her success, as well as the scholarships which allowed her to attend college, to the unique and advanced experience gained through the ASPIRE program.

Panel 2

Ms. Daniel works for the Consortium for Materials Development in Space (CMDS), a government-industry-university partnership which promotes commercial space-based materials development and transport. CMDS is one of twelve Centers for the Commercial Development of Space (CCDS) programs which gives students (K-college) the opportunity to participate in actual space science projects through experiments on the Space Shuttle, sounding rockets, and other lab and simulation facilities. The Consortium provides opportunities for students to become directly involved with actual NASA projects. Ms. Daniel participated various projects which introduced her to the technical and administrative aspects of satellite and shuttle-based experiments. In her opinion, programs like CMDS not only provide students with invaluable experience, but provide enthusiastic and relatively inexpensive support to the employer. Ms. Daniel is now Asst. Operations Mgr. for another shuttle experiment and plans to earn her Ph.D in microgravity research after graduating this Spring.

Dr. Shipman described The Outreach Program, a block of NSF-funded programs at Alabama A&M that aims to reach fifth grade-undergraduate students and increase their understanding and interest in science and math through: (1) enriching the education of minority students through science field trips, computer training, communication, study and testing skills development; (2) placing minority undergraduate students from Alabama A&M and other

Historically Black Colleges and Universities directly into laboratories to work on research projects with mentor scientists; and (3) establishing a mentoring network of scientists, upper level students and teachers. Dr. Shipman stated that "science intervention programs ... are important in an effort to help bridge the deficient gap in student proficiency and interest in the sciences" and that they are essential because of the increasingly technical nature of society and the job market.

Mr. Thomas described the major goals of the CCEP. They are: (1) teaching teachers to utilize technology and helping them to develop and increase math/science knowledge and interest in their students; (2) contributing to Marshall Space Flight Center (MSFC) research objectives; (3) developing program-related aerospace curricula at the participants' home schools; and (4) developing communication networks among the participating teachers and schools. CCEP, like the aforementioned programs, provides its participants with hands-on experience and participation in actual aerospace projects using state-of-the-art technology. As a participant in this summer's CCEP internship, Mr. Thomas gained experience that not only allowed him to apply his independent research with evolving real-world technology, but will enable him to "understand, apply and teach [his] students" about such technology.

The record of this meeting will not be published.

4.2(p)—The Future of Antarctic Research

July 23, 1996

Hearing Volume No. 104-65

Background

On July 23, 1996, the Subcommittee on Basic Research held a hearing entitled, "The Future of Antarctic Research," on the future of U.S. scientific research in Antarctica. The National Science Foundation (NSF) administers $196 million annually for the U.S. Antarctic Program (USAP), which includes infrastructure and operations of three research stations and two ships, as well as related research activities. In light of post-Cold War changes in the geopolitical map, restricted budgets and the needs of the aging South Pole Station, the National Science and Technology Council (NSTC) recently issued a report which reaffirms U.S. Antarctic policy and makes recommendations for the future of the USAP. This hearing focused on the conclusions of the NSTC report, the importance of U.S. research, options for international cooperation, remedies for immediate and long-term health and safety issues, and transition of logistical support from the Navy to the Air National Guard.

Testifying in Panel one were: The Honorable Ernest Moniz, Assistant Director for Science, Office of Science and Technology Policy (OSTP), Executive Office of the President; Dr. Neal Sullivan, Director, Office of Polar Programs, NSF; Mr. R. Tucker Scully, Director, Office of Ocean Affairs, U.S. Department of State; and The Honorable Robert Pirie, Assistant Secretary for Infrastructure and the Environment, Department of the Navy.

Panel two featured: Dr. Robert Rutford, Professor of Geosciences, University of Texas at Dallas and past Chairman, Polar Research Board, National Research Council (NRC)/National Academy of Sciences (NAS); and Dr. David L. Clark, Chairman, Polar Research Board, NRC/NAS.

Summary of hearing

Panel 1

Dr. Moniz voiced the Administration's support of the NSTC report and discussed its findings and recommendations. The report makes six major points: (1) Scientifically, the USAP is key because it provides a unique, pristine laboratory for astronomy, particle physics, and large scale earth and eco-sciences; and it serves as a base for exploration of the largely unexplored Antarctic continental/ocean region; (2) geopolitically, the USAP provides an active, influential and year-round U.S. presence in an historically unstable region; (3) NSF has been an effective manager of the program in terms of science, environmental stewardship, and efficient operations, including privatization of support services, which saved $3.2 million last year and will save $10 million by 2000; (4) current investment is sound, and NSTC supports continued operation of the three existing stations; (5) health, safety and environmental problems, especially at the South Pole Station must be addressed; and (6) NSF should convene an external panel to examine further cost-saving options and ensure continued program quality.

Dr. Sullivan elaborated on the importance of the USAP's scientific mission and achievement, and outlined NSF's progress in streamlining and economizing the USAP without sacrificing scientific integrity. He stated that the USAP has adopted a five-year program to address waste management, resulting in a 70% recycling rate; and privatization of vehicle and food services are underway, with potential privatization of air traffic, medical services and fire management, consistent with changes already in place. In addition, the program is shifting some Department of Defense (DOD) responsibilities to civilian contractors and transferring transportation support from the Navy to the Air National Guard. Dr. Sullivan also stated that the South Pole Station, the only year-round U.S. facility in Antarctica, is nearing the end of its program life and is in immediate need of facility, safety and health upgrades, including a new power plant and fuel storage facilities for which NSF sought $25 million for its FY97 Major Research Equipment Account. Further, and as prescribed by the NSTC report, NSF has convened an external peer review panel to investigate proposals for a long-term South Pole Station upgrade and alternatives.

Mr. Scully stated that the Antarctic Treaty of 1959 and the continued active U.S. presence in the Antarctic via the USAP have been important components of U.S. foreign policy spanning Administrations and accomplishing numerous foreign policy objectives. The Treaty establishes the region as free for scientific research and prohibits territorial claims, military activity and nuclear testing; it protects the environment from industrialization/economic development; and it provides a peaceful forum for Treaty maintenance which has been recognized even in times of conflict and the Cold

War. Notably, a treaty nation's influence in the region is directly proportional to that nation's scientific participation—currently, 26 nations participate, half of which have significant programs. For 35 years, the United States has been at the center of Antarctic decision-making because of the USAP, which currently comprises 25% of total research. Such activity demonstrates commitment not only to leading-edge science, but to international cooperation and stability. According to Mr. Scully, by lessening its presence in Antarctica, the United States would effectively abdicate its leadership and likely invite territorial conflict.

Secretary Pirie stated that the post-Cold War military drawdown and a constrained budget have necessitated Naval withdrawal from the region. He outlined the first phase of transition, including the continuing privatization of logistics in virtually all support areas (transportation, food, public works, waste management, etc.). Second, helicopter operations are being contracted to the private sector. Finally, the Navy will transfer operation of the USAP's ski-equipped LC-130s (owned by NSF, currently operated by the Navy) over three years, to the Air National Guard—a perfect fit for the job because of its long-standing mission and experience in both polar regions and its extensive use of the LC-130. This transfer of duty will yield numerous benefits to both NSF and the Air Guard, including substantial savings to NSF, making the Air Guard single-point manager of polar transport, and deferment of new aircraft procurement by both.

Panel 2

Dr. Rutford reiterated the importance of the leadership role the USAP plays, in terms of leading-edge science and in the international community. In considering the future of the USAP, he continued that the United States must act decisively because of the long-term commitment involved and the ever-evolving nature of the research. He stated that the USAP currently has a good infrastructure mix which allows high-quality, highly flexible, wide-ranging research and emphasized the importance of a year-round station. The South Pole Station has immediate needs that must be met. Dr. Rutford praised NSF for its "exemplary" management of the program in terms of efficiency, its willingness to address fiscal constraints through privatization and the LC-130 transfer. On a different note, he added that international cooperation among scientists is vital to Antarctic research, but that an international station "would not be in the best interest of the U.S.," especially for health and safety reasons.

Dr. Clark addressed the needs of the USAP in the context of today's budget environment and stated that the program is highly efficient; and for a relatively small investment, the United States reaps broad benefits across virtually all fields of science and allows research opportunities unavailable anywhere else in the world. Specifically, large-scale systems study—and its application to questions of plate tectonics, oceanography, atmospheric and climatic systems, etc., and to problems of immediate public concern, such as oil spill clean-up and the ozone hole—is only possible in the region. Unparalleled science combined with the foreign policy and national security benefits gained by maintaining a strong presence in Ant-

arctica more than justify the current investment, and in Dr. Clark's opinion, provide a model for future large-scale research missions. Similarly, as data collection and space-based technology advances, U.S. polar research programs must keep up.

4.3 SUBCOMMITTEE ON ENERGY AND ENVIRONMENT

4.3(a)—FY 1996 DOE, EPA, and NOAA R&D Budget Authorizations

February 13, 14, 15, 16, and 21, 1995

Hearing Volume No. 104-10

February 13, 1995:

Background

On February 13, 1995, the Subcommittee on Energy and Environment held a hearing entitled to receive testimony on ways to reduce spending in the research and development programs of the three agencies under the Subcommittee's jurisdiction: DOE, EPA and NOAA.

The panel of witnesses included: Mr. Thomas A. Schatz, President of Citizens Against Government Waste; Ms. Jill Lancelot, Director of Congressional Affairs for the national Taxpayers Union; Dr. A. Alan Moghissi, Associate Vice President of Environmental Health and Safety at Temple University; Dr. William Happer, Professor of Physics at Princeton University; and Mr. Victor Rezendes, Director of Energy and Science Issues in the Resources, Community, and Economic Development Division of the U.S. General Accounting Office.

Summary of hearing

Mr. Schatz recommended that before members of the Subcommittee approve the expenditure of one more tax dollar on programs under the Subcommittee's jurisdiction, they "should ask themselves two questions: (1) Is this project worth the further weakening of our representative government?; and (2) Is this a project I want my children and grandchildren to be responsible for paying?" Mr. Schatz gave specific suggestions for reducing and/or eliminating projects and claimed savings over the next five years.

Ms. Lancelot recommended the cancellation of the Tokamak Physics Experiment (TPX), termination of the Gas Turbine-Modular Helium Reactor (GT-MHR) and the Advanced Neutron Source (ANS). She also suggested an investigation of issues surrounding the proposed privatization of the Uranium Enrichment Corporation (USEC). She said there are concerns that it "could be making decisions that are inconsistent with the decisions of a privatized corporation, and appear to potentially put taxpayers at risk."

Dr. Moghissi noted that since the inception of the EPA, its R&D has been criticized. Dr. Moghissi recommended that EPA's R&D emphasize assessments and monitoring. He also recommended that EPA mandate reliance upon BAS (Best Available Science) in all its decisions and undertake a research effort with the objective to remove all societal objectives from its risk assessment process. He

also said EPA should encourage staff to publish the results of R&D activities in peer-reviewed scientific journals.

Dr. Happer testified in support of R&D in general. He reviewed what he considers some of the most important research and development activities of DOE. The activities he discussed were: nuclear weapons research; basic research; risk assessment; the GOCO concept; essential services of DOE; and safe disposal of nuclear waste.

Mr. Rezendes stated that DOE's mission and priorities have changed dramatically since 1977 when the Department was created. He noted that DOE's original priorities included energy research, conservation and policy-making, and today's DOE budget focuses on weapons production and environmental cleanup. Mr. Rezendes noted DOE's management problems and stated that GAO is also examining the roles and missions of DOE's national laboratories. He said DOE needs to better define the roles of labs and manage them in a way that promotes progress toward its goals. Mr. Rezendes testified that three questions should be addressed in considerations that could change DOE missions: (1) Which missions should be eliminated because they are no longer a valid government function?; (2) For those missions that are inherently governmental, what organizational arrangement would be best suited to achieving these missions?; and (3) Could the private sector perform some of these missions better?

February 14, 1995:

Background

On February 14, 1995, the Subcommittee on Energy and Environment held a hearing to receive testimony from (DOE) officials and outside witnesses on DOE's Fiscal Year 1996 budget requests for energy R&D programs under the Subcommittee's jurisdiction.

Witnesses were presented in two panels. Panel one consisted of Department of Energy officials including: Ms. Christine A. Ervin, Assistant Secretary for Energy Efficiency and Renewable Energy; Ms. Patricia Fry Godley, Assistant Secretary for Fossil Energy; Dr. Tara J. O'Toole, Assistant Secretary for Environment Safety and Health; Rear Admiral Richard J. Guimond, Principal Deputy Assistant Secretary for Environmental Restoration and Waste Management; and Mr. Ray A. Hunter, Acting Deputy Director, Office of Nuclear Energy.

Panel two contained outside witnesses including: Mr. Myron Gottlieb, Vice President of Natural Gas Supply Technology Development at the Gas Research Institute; Mr. Linden Blue, Vice Chairman of General Atomics; Dr. Amos E. Holt, Senior Vice President of Engineering for the American Society of Mechanical Engineers; and Mr. Michael L. Marvin, Director of Governmental and Public Affairs for the American Wind Energy Association.

Summary of hearing

Panel 1

Ms. Ervin said the request for budget increases would generate significant savings and benefits to the nation. Ms. Ervin stressed that the program emphasizes voluntary partnerships with industry and local governments that are highly leveraged with matching

funds. She stated that the Energy Audit Program saved small and medium-sized businesses an average of $20,000 per audit. She also emphasized the development and commercialization of alternative fuels as well as the Partnership for a New Generation of Vehicles. Ms. Ervin asked for increases to support programs that partner with the housing industry to apply energy-efficient technologies to both residential and commercial projects. She also asked for R&D funding for cost-share demonstrations of biomass projects related to the utility sector.

Ms. Godley testified that it is important for the Federal Government to invest in the development of energy technology when "market participants are unable or unwilling to take the high-risk" involved. She emphasized the declining rate of domestic oil production to call for support of DOE's programs to help independent producers recover hard-to-get oil and gas deposits. Ms. Godley also pointed out that coal currently fuels 55 percent of electric power generation in the United States and that most new power plants in the near term will be coal or gas-fired. She requested federal funding to develop new, cleaner coal and natural gas-fired power systems. Ms. Godley said the Advanced Computational Technology Initiative will help meet these objectives for the oil and gas industry. She also called for support of the Clean Coal Technology Program and indicated fuel-cell development is a direct result of federal investment.

Dr. O'Toole said the job of DOE's Office of Environment, Safety and Health is to prevent environmental health and safety problems at DOE facilities, with an emphasis on the nuclear weapons complex. Dr. O'Toole stated that increases in the budget request for the Office of Health are efforts to prevent worker exposure to hazardous materials and help to states performing studies of health effects from DOE facilities. Dr. O'Toole also asked for additional funding to continue studies in Byelorussia on the health effects stemming from Chernobyl.

Rear Admiral Guimond testified that DOE is "dramatically changing" the way the agency runs environmental management. He said that a cut of $4.4 billion from projected targets will be accomplished by improvements in productivity and "ensuring (our) agreements with states and EPA are based on reasonable cost-effective approaches and schedules." Admiral Guimond said the Technology Development program has undergone dramatic changes by developing four focus areas: mixed waste characterization; radioactive waste tank remediation; contaminated plume containment remediation; and landfill stabilization.

Mr. Hunter stated his priority programs are the Advanced Light Water Reactor project and a cost-shared program to help utilities extend the life of currently operating nuclear plants. He noted other important programs include helping Russia in its operation of nuclear facilities and isotope production and distribution (with emphasis on U.S. production capability of molybdenum-99). He also noted that his office is downsizing from 258 FTEs in 1993 to 154 in 1996.

Panel 2

Mr. Gottlieb testified in favor of DOE's budget request. He stated that the DOE budget for applied energy RD&D can be reduced by obtaining the co-funding of projects with industry and through the prioritization of projects. He stated that the partnerships with private industry will bring more rigorous cost/benefit analysis and privatization to the government, shortening the time and increasing the probability of effective commercialization. He asked that while Congress considers reductions for applied R&D funds, that they consider the phasing out of projects rather than immediate termination. This transition is important to allow current jointly funded projects with industry to be completed and to allow industry time to adjust its R&D plans and budgets. He also requested Congress consider providing an economic incentive to industry to make increased private sector RD&D a reality.

Mr. Blue asked for support of the Gas Turbine-Modular Helium Reactor (GT-MHR). He spoke about the relationship of GDP to electricity growth. Mr. Blue noted the GT-MHR also has potential to destroy plutonium and produce tritium. He also indicated that the Japanese are investing heavily in this technology.

Mr. Holt described the Society's analysis of the DOE budget. He stated that the nation's security is also dependent upon our energy and economic security. He stated economic security cannot be achieved in the absence of energy security. He urged that as Congress deliberates the priorities in the Department's R&D budget proposal this year, every consideration be given to sustaining a strong educational component of energy R&D.

Mr. Marvin testified in support of DOE's Wind Energy Research and Development program. He said there is good reason to expect that in the next 10 or 12 years wind energy will generate the cheapest electricity of any energy source. He claimed that wind energy, per unit of energy, creates more jobs than any other utility-scale technology.

February 15, 1995:

Background

On February 15, 1995, the Subcommittee on Energy and Environment held a hearing to receive testimony on DOE's FY 1996 budget request for the Office of Energy Research. The purpose of the hearing was to receive testimony on the DOE FY 1996 budget request from the Director of Energy Research for DOE and directors of five of the multi-program national laboratories, as well as testimony on DOE's Fusion Energy Program.

The witnesses included: Dr. Martha Krebs, Director of DOE's Office of Energy Research (OER), and two panels.

Panel one focused on the Scientific Facilities Initiative and included: Dr. John Peoples, Jr., Director of Fermi national Accelerator Laboratory; Dr. Nicholas P. Samios, Director of Brookhaven national Laboratory; Dr. Alvin W. Trivelpiece, Director of Oak Ridge national Laboratory; Dr. Alan Schriesheim, Director of Argonne national Laboratory; and Dr. Charles V. Shank, Director of Lawrence Berkeley Laboratory.

Panel two focused on the Fusion Energy Program and included Dr. Robin Roy, Project Director of the Office of Technology Assessment (OTA), and Dr. David E. Baldwin, Associate Director for Energy at Lawrence Livermore national Laboratory.

Summary of hearing

Dr. Krebs testified that the OER programs are a major element of the nation's investment in basic research. She stated that the 1996 budget request for these programs totals about $2.75 billion, an increase of about $90 million from 1995. She noted that the major elements of increase within that budget are the Scientific Facilities Initiative and the renewal of high energy and nuclear physics programs in the aftermath of the Superconducting Super Collider (SSC) termination. She also noted that the request included increases to the Basic Energy Sciences Program, as well as high energy and nuclear physics to increase the operating times of large scientific facilities. Dr. Krebs said the initiative will provide more time, support more users, and result in more science and basic research that meets the tests and needs of energy and environmental missions. Dr. Krebs said the budget also includes a proposal for the construction of the TPX and continued participation in the ITER Engineering Design Activities. She also discussed neutron scattering and stated that DOE had terminated the Advanced Neutron Source due to its increased costs.

Panel 1

Dr. Peoples commented on the purpose of the Scientific Facilities Initiative contained in the Department's FY 1996 budget request. He said it is to increase the effective scientific use of the extraordinary user facilities. He stated that in recent years the lack of funding has kept some of these facilities from operating at levels commensurate with their capabilities.

Dr. Samios focused his testimony on the $100 million facilities initiative of which $25 million is being proposed for nuclear physics. He stated that in most of these facilities, the fixed costs are so large that a 20-percent reduction in the budget means that the facility is unable to operate. He said that the leverage factor is very large and that is why the additional $25 million in the nuclear physics budget request would have an extraordinary effect on the utilization of these facilities.

Dr. Trivelpiece testified that a small amount of incremental dollars makes a large difference in operations. He noted the possibility of funds decreasing so much that the facilities can't operate, but yet they would still be costing money. He stated that a small difference in dollars produces a substantial improvement in operation. Dr. Trivelpiece also discussed neutrons and the neutron science.

Dr. Schriesheim focused on synchrotron radiation sources and urged support for increased used of these facilities.

Dr. Shank testified that the DOE facilities represent a significant investment and serve as tools for probing the fundamental properties of matter by scientists from universities, federal labs, and industry. Dr. Shank stated the Initiative will make these facilities more effective for use by the broad scientific community. He also said the investment will provide a great value in delivering ana-

lytic capability to keep the nation at the forefront of science and technology.

Panel 2

Dr. Roy discussed DOE's Fusion Energy Program and released OTA's Background Paper, *Fusion Energy Program: The Role of TPX and Alternate Concepts.* The study was produced in response to a request from the Science Committee to examine two Fusion Energy Program issues: (1) the role of the Tokamak Physics Experiment (TPX); and (2) the role in the Fusion Energy Program of alternative (i.e., non-tokamak) concepts. Dr. Roy noted that meeting the current fusion energy goals requires annual budgets of $700-$900 million. He also noted that if current plans are pursued, the greatest single near-term budgetary requirement for the Fusion Energy Program would be international cooperation to build the ITER. He stated that ITER is roughly estimated to cost on the order of $10 billion, and if successful, ITER would be the first device to demonstrate controlled ignition of fusion fuel.

With regard to the TPX, Dr. Roy testified that construction costs of approximately $700 million would be followed by annual operating budgets of around $150 million. He noted that no other partner in the ITER project has found it necessary to pursue an interim device with TPX's capabilities as part of the program for successful development of ITER. He also specifically noted that there is uncertainty with the tokamak concept.

In summary, Dr. Roy stated that while alternate (or alternative) concepts are no panacea for fusion energy, or necessarily for energy policy for the 21st Century, there is merit in examining them as part of a broad fusion program. He stated that the current program goals and direction, including construction and operation of large new tokamaks, require a doubling or tripling of budgets.

Dr. Baldwin spoke in support of the Administration's FY 96 budget request of $366 million. He said that this level permits the program to continue developing the tokamak as its principal fusion concept, but is insufficient to pursue meaningful development of specialized materials and non-tokamak alternatives. Dr. Baldwin testified that the current U.S. fusion program focuses on the goal of a tokamak demonstration reactor and places heavy reliance on international cooperation. He stated that the ITER is a conservative design because it is an experiment. He also emphasized that the ITER is not a reactor prototype.

February 16, 1995:

Background

On February 16, 1995, the Subcommittee on Energy and Environment held a hearing to receive testimony from EPA and public witness on EPA's Fiscal Year (FY) 1996 budget request for its Office of Research and Development (ORD). The Energy and Environment Subcommittee has jurisdiction over ORD. The Administration's FY 1996 $7.4 billion request (+$138 million or 2%) for EPA includes $629 million for ORD. The request for ORD represents an $83.8 million (15%) increase over its FY 1995 funding level.

Witnesses included: Dr. Robert J. Huggett, Assistant Administrator for the Office of Research and Development at the Environmental Protection Agency, and Dr. Roger O. McClellan, President of the Chemicals Industries Institute of Toxicology, and member of the Executive Committee of the Science Advisory Board.

Summary of hearing

Dr. Huggett testified in support of EPA's ORD FY 1996 budget request of $629 million. He explained that ORD is making dramatic changes in the way it operates. ORD's chief objective is to provide EPA with the sound scientific data it requires to promulgate appropriate regulations. ORD is improving its science by redirecting its research monies in two manners. First, ORD will increase its budget for long-term research. Second, ORD will increase its use of extramural research through an expanded grants program. Dr. Huggett also discussed ORD's laboratory reorganization plan which will establish three national laboratories and two national centers to coordinate the activities of ORD's laboratories. He concluded by outlining ORD's intent to triple, from 100 to 300, the number of environmental fellowships it funds over the next two years.

Dr. McClellan testified to the importance of good science in the promulgation of EPA regulations. He noted that approximately $150 billion is spent every year complying with environmental regulations and that any marginal improvement in the science used as a basis for these regulations can yield significant economic returns. Dr. McClellan stated that EPA as a whole should redirect more of its resources to research and development. He spoke in favor of increasing extramural research and singled out the need for additional research on ozone and air-borne particulate matter. He also noted the need to improve the quality of data on EPA's Integrated Risk Information System (IRIS). Dr. McClellan concluded by emphasizing the need for better research management within ORD.

February 21, 1995:

Background

On February 21, 1995, the Subcommittee on Energy and Environment held a hearing to receive testimony from NOAA and outside witnesses on NOAA's Fiscal Year (FY) 1996 budget request for its programs under the Subcommittee's jurisdiction, as well as to receive additional testimony on the FY 1996 budget request for the Department of Energy (DOE) energy R&D programs.

Witnesses included: Dr. D. James Baker, Under Secretary for Oceans and Atmospheres, and Administrator of NOAA, U.S. Department of Commerce, and two panels of outside witnesses.

Panel one consisted of outside witnesses testifying on programs within NOAA including: Mr. Joel Myers, President of Accu-Weather, Inc., and Mr. Joel Willemssen, Director of the Accounting and Information Management Division of the U.S. General Accounting Office.

Panel two focused on DOE Research and Development (R&D) programs and included: Mr. Scott Sklar, Executive Director of the

Solar Energy Industries Association, and Mr. Howard Geller, Executive Director of the American Council for an Energy-Efficient Economy.

Summary of hearing

Dr. Baker outlined the priorities within NOAA's $2,195,400,000 FY 1996 budget request. Of these funds, approximately $1.8 billion fall under the jurisdiction of the Energy and Environment Subcommittee. Within the Subcommittee's jurisdiction, the FY 1996 request represents an increase of $179 million over FY 1995 appropriations. Dr. Baker listed modernization of the NWS as NOAA's top priority to improve technology used for weather forecasting and lead to the consolidation of over 300 weather service offices into 118 facilities. Dr. Baker indicated that the country's initial investment in the weather service modernization will be repaid within two years, and once complete, contribute over $7 billion in savings to the nation's economy through improved capacity for storm weather and long-term forecasting. Dr. Baker emphasized the importance of NOAA's strategic plan which creates the "vision" for the agency through the year 2005, enabling NOAA's environmental stewardship assessment and prediction programs to become "keystones to enhancing economic prosperity."

Panel 1

Mr. Myers stated that the commercial weather services can save the government substantial sums by replacing services currently provided by the NWS and amending the 1890 NWS Organic Act to conform with the 1990 NWS policy statement on the role of the private weather industry and the NWS. Mr. Myers also cited the potential savings identified by a Booz Allen & Hamilton study that noted overlapping NWS structures which could be consolidated and found savings of $100 million annually if the NWS reduced its weather service offices from 334 to 25.

Mr. Willemssen emphasized three main points from GAO's review of the NWS modernization efforts: (1) the modernization effort is an outstanding opportunity for the NWS to streamline and downsize its organization while at the same time improving its services; (2) NWS has made progress on modernization but problems and risks remain in key systems; and (3) NWS must act quickly to correct these problems and address the risks or the modernization effort could fail to met its goals.

Panel 2

Mr. Sklar outlined the significant Third World need for reliable cheap energy. According to Mr. Sklar, solar can play a major role in addressing the Third World's growing energy needs. He indicated that the market for solar energy is growing between twenty and thirty percent a year. One factor driving this growth is the decrease in material costs associated with building solar energy sources. Mr. Sklar supported DOE's investment in solar and the President's FY 1996 request of $423 for renewable energy research and development.

Mr. Geller spoke in support of DOE's energy efficiency programs and the Administration's FY 1996 request for energy conservation

research and development. He stated that energy efficiency research yields substantial returns to the Federal Government and taxpayers. As an example, Mr. Geller pointed out that the Federal Government invested roughly $3 million fifteen years ago in electronic ballast research. As a result of this research, roughly $500 million worth of fluorescent light ballasts have been sold. The tax revenue generated from these sales far exceeds the government's research costs, he said.

4.3(b)—Alternative Futures for the Department of Energy National Laboratories "The Galvin Report" and "National Laboratories Need Clearer Missions and Better Management, a GAO Report to the Secretary of Energy"

March 9, 1995

Hearing Volume No. 104-11

Background

On March 9, 1995, the Subcommittees on Basic Research and Energy and Environment held a joint hearing entitled, "Alternative Futures for the Department of Energy national Laboratories 'The Galvin Report' and 'national Laboratories Need Clearer Missions and Better Management, a GAO Report to the Secretary of Energy,'" on alternative futures and clearer missions/management of the Department of Energy's national Laboratories, based on the recommendations of the Galvin Task Force and the GAO.

When the Department of Energy was created in 1977, it inherited the national Laboratories with a management structure that had evolved from the World War II "Manhattan Project," whose mission was to design and build the world's first atomic bombs. From this national security mission, the laboratories generated expertise that initially developed nuclear power as an energy source. The laboratories' missions broadened in 1967, when the Congress recognized their role in conducting environmental as well as public health and safety-related research and development. In 1971, the Congress again expanded the laboratories' role, permitting them to conduct non-nuclear energy research and development. During the 1980's, the Congress enacted laws to stimulate the transfer of technology from the laboratories to U.S. industry. The Department of Energy estimates that over the past 20 years, the nation has invested more than $100 billion in the laboratories.

The 1990's have accelerated the laboratories' diversification from defense and nuclear research to environmental issues and the development of commercial technologies.

The purpose of this hearing was to identify and examine the principal issues affecting the laboratories' missions and the Department of Energy's approach to laboratory management. Witnesses were presented in three panels.

Panel one consisted of: Mr. Robert Galvin, Chairman of the Task Force on Alternative Futures for the DOE national Laboratories (and Chairman of the Executive Committee of Motorola Inc.), and the Honorable Hazel O'Leary, Secretary of the U.S. Department of Energy.

The second panel included: Dr. Siegfried Hecker, Director of Los Alamos national Laboratories; Dr. Bruce Tarter, Director of Lawrence Livermore national Laboratory; and Dr. Albert Narath, President of Sandia national Laboratories.

Panel three consisted of: Dr. John Denson, Director of Idaho national Engineering Laboratory; Dr. Charles Gay, Director of the national Renewable Energy Laboratory; Dr. Nicholas Samios, Director of Brookhaven national Laboratory; Dr. Alan Schriesheim, Director of Argonne national Laboratory; Dr. William Madia, Director of the Pacific Northwest Laboratory; Dr. Charles Shank, Director of Lawrence Berkeley Laboratory; and Dr. Alvin Trivelpiece, Director of Oak Ridge national Laboratory.

Summary of hearing

Panel 1

Mr. Galvin testified that a bold plan of action was needed to salvage and restructure DOE. He emphasized five primary missions of the national Laboratories: national security; energy; environmental cleanup; economic development with appropriate industry; and science and engineering. He also encouraged the labs to become a single entity with a focus on core missions; DOE to streamline radically; and Congress to bear the brunt of the responsibility for a new system of governance for the labs. He recommended that the laboratories be corporatized, a major energy agenda be embraced, and Congress recommit support for national defense for a minimum of forty years.

Secretary O'Leary discussed the Galvin report stating that she agreed with many of the recommendations but disagreed with the recommendation to corporatize the national Laboratories. She supports the concept of managing the laboratories like a corporate entity. Secretary O'Leary noted the realities DOE must face as the national security focus changes to accommodate dismantling weapons, non-proliferation, and maintaining a safe and reliable stockpile. She also presented the improved cleanup record of DOE and the role she envisions for DOE's environmental management team.

Panel 2

Dr. Hecker stressed fixing GOCO, rather than corporatizating, allowing for flexibility and independence within the labs. He emphasizes that the labs must work with industry to maintain the high level of technology and to provide leverage to garner federal research investment, cautioning Congress to carefully consider any cutbacks in this area. According to Dr. Hecker, Congress must allow DOE to redefine its own missions, as well as those of the labs—then, make it a goal to downsize the labs in the right manner, for the best productivity and service to the nation.

Dr. Narath urged Congress to proceed cautiously when considering DOE mission differentiation, so that multipurpose labs do not become single-purpose labs. He advises DOE to take advantage of the diversity, to create a "system of laboratories," seeking more inter-lab cooperation. He also stressed the importance of the university and industry partnerships with the labs, which will be critical to DOE's success as it moves from a nuclear weapons mission

to pursuing missions relating to energy, environment, and basic science.

Dr. Tarter testified that strong leadership from DOE and reduced government management will make the labs both more efficient and cost-effective. He expressed concern about downsizing the labs and believes that as the missions and the leadership of DOE are improved and defined, the question of size will take care of itself. Dr. Tarter stated that adhering as closely as possible to the original GOCO format would maintain the strength of excellence and the missions of the labs.

Panel 3

Dr. Denson endorsed a "system of laboratories," where the national Laboratories act as one entity. He noted that the primary missions of DOE will be strengthened by a well directed technology transfer program.

Dr. Gay discussed a performance-based award fee "report card" from DOE and "sunset clauses" which provide criteria for technology development projects. He spoke against corporatizing the labs but recommended the "privatization of technologies" for spin-off technology. He also approved of DOE's strategic realignment.

Dr. Samios testified that the problems of the labs have ensued because of short-term goals and the governance imposed by Congress and the Administration (i.e. too much regulation and red-tape). He stated that a long-term plan is definitely needed to address these issues. He spoke in support of government investment in large-scale scientific user facilities to "push the frontier of science" and to close older facilities which are no longer cutting edge, while creating state of the art facilities to comply with DOE/laboratory missions.

Dr. Schriesheim stressed the importance of the ties between energy and environmental technologies and the global impact of how to achieve effective environmental growth and balance. He backed DOE's Scientific Facilities Initiative, which increased the availability of facilities for industry and university users. Dr. Schriesheim endorsed external regulation by EPA, OSHA, and NRC, rather than DOE regulation, to improve the GOCO system.

Dr. Madia testified that when encouraging a stronger missions focus a model must address "cross-fertilization" of technologies and application of the unique laboratory system. He stated that forces of supply and demand will naturally determine laboratory capacity and a business approach is necessary in assignment and flexibility of R&D. He also stated that environmental technology and energy research are the best solution to pursue in order to insure economic energy and environmental security.

Dr. Shank affirmed that national security depends on a scientific foundation enhancing and paralleling national interests. The national Laboratories are a cornerstone of enduring U.S. leadership. He cited that the "most exciting scientific advances are occurring at the boundaries between the fields." Each area plays off the other in terms of technology, innovation, and application of disciplines.

Dr. Trivelpiece underscored that the GOCO concept of governance has been severely neglected and that it must be given a

chance to improve and revitalize itself before it is abandoned altogether.

4.3(c)—Restructuring the Federal Scientific Establishment: Future Missions and Governance for the Department of Energy (DOE) national Laboratories, H.R. 87, H.R. 1510, H.R. 1993 (Title II), and H.R. 2142

September 7, 1995

Hearing Volume No. 104-30

Background

On September 7, 1995, the Subcommittees on Basic Research and Energy and Environment held a joint hearing entitled, "Restructuring the Federal Scientific Establishment: Future Missions and Governance for the Department of Energy (DOE) national Laboratories, H.R. 87, H.R. 1510, H.R. 1993 (Title II), and H.R. 2142," on the restructuring of the DOE national Laboratories.

During the 104th Congress, several legislative proposals have been introduced which would significantly restructure the DOE national Laboratories. Pending legislation includes proposals to: restructure and terminate some or all the labs; effect major reductions in personnel at the non-defense program labs; and review and assign narrower missions for the labs in conjunction with possible streamlining. Another issue addressed in some of the legislative proposals is governance of the labs, whether by DOE through a more traditional government-owned, contractor-operated (GOCO) role, with or without DOE internal regulation, or through corporatization/privatization of the labs.

This is the second in a series of hearings in which the Committee on Science is examining options for restructuring the federal scientific establishment. The goals of this legislative hearing will be to examine the role of the DOE laboratories within that broader context, and specifically, to receive testimony on four pieces of legislation pending before the two Subcommittees: H.R. 2142, the "Department of Energy Laboratory Missions Act" (Mr. Schiff); H.R. 87, the "Department of Energy Laboratory Facilities Act of 1995" (Mr. Bartlett); Title II of H.R. 1993, the "Department of Energy Abolishment Act" (Mr. Tiahrt); and H.R. 1510, the "Department of Energy Laboratories Efficiency Improvement Act" (Mr. Roemer).

Witnesses were presented in three panels following the testimony of the Honorable Charles B. Curtis, Acting Deputy Secretary of the U.S. Department of Energy.

Panel one included: Mr. Robert W. Galvin, Chairman of the Executive Committee of Motorola Inc.; Mr. Erich Block, Acting President and Distinguished Fellow of the Council on Competitiveness; Dr. Charles M. Vest, President of the Massachusetts Institute of Technology; Mr. Sherman McCorkle, President of Technology Ventures Corporation; and Dr. Bruce L.R. Smith, Senior Staff at the Brookings Institute.

The second panel consisted of DOE contractors and included: Dr. Frederick M. Bernthal, President of the Universities Research Association; Dr. Albert Narath, President of the Energy and Environ-

ment sector at the Lockheed Martin Corporation; Dr. Douglas E. Olesen, President and CEO of Battelle Memorial Institute; and Dr. C. Judson King Interim Provost at the University of California.

Panel three contained directors of national laboratories and included: Dr. Charles F. Gay, Director of the national Renewable Energy Laboratory (NREL),; Dr. Siegfried S. Hecker, Director of the Los Alamos national Laboratory; Dr. Alan Schriesheim, Director of Argonne national Laboratory; Dr. C. Bruce Tarter, Director of Lawrence Livermore Laboratory; Dr. Alvin W. Trivelpiece, Director of Oak Ridge national Laboratory; and Dr. John C. Crawford, Executive Vice President of Sandia national Laboratories.

Summary of hearing

Deputy Secretary Curtis testified that DOE is actively trying to bring down costs while enhancing R&D efficiency and performance at the national Labs. He stated that the Department has not forced its nine multi-program laboratories into tightly defined missions so not to sacrifice their versatility. Mr. Curtis spoke in support of H.R. 2142, and its efforts aimed at creating a refined mission framework for the national Laboratories. He does not support H.R. 1510's mandated reduction of DOE laboratory personnel by one-third over 10 years. He says the reduction would dictate how much work could be performed at the DOE labs through a steady constriction of their employment rolls. He also spoke against H.R. 87 and Title II of H.R. 1993 saying he opposed a broad closure effort for DOE's laboratories and the proposed method for addressing opportunities for consolidation and restructuring.

Panel 1

Mr. Galvin testified against the closing of the labs and proposed corporatization of the labs. Under his plan the government would continue to own DOE's facilities, but the labs would be overseen by a board of trustees composed of industry and academic leaders. The government would retain title to the sophisticated, complex physical assets of the laboratories and would continue to fund the labs as well as university research at near-current levels. The labs would be operated by the private sector. DOE would remain the sponsor of the labs and the Federal Government would continue to be the labs' principle customer although they would also serve university and corporate clients. Mr. Galvin stated that the simplification would lead to a 75 percent reduction in DOE's lab personnel. He noted that the structure could include the following conditions: DOE will carry out a revised role; the corporation will be subject only to "normal" federal and state control of commercial companies; and the Federal Government will continue to bear preexisting liabilities associated with the labs. Annual reports must document the presence of internal accounting and control systems. Audit reports will be submitted to Congress. The corporation has the authority to make financial commitments without fiscal year limitations. The corporation will not have to hire people from within the civil service system. A transitional planning mechanism will be put into place.

Mr. Bloch testified that the U.S. government spends too big a portion of the R&D budget on federal labs. He stated that the prob-

lem resides with DOE organization, its management style and oppressive controls. Mr. Bloch said the solution lies with reducing bureaucracy, regulations, micro-management from the top, and overhead costs, while focusing on the mission of the laboratories, their programs and projects. He spoke in support of H.R. 2142. In his testimony, Mr. Bloch listed some ground rules for streamlining: (1) DOE and its labs must be considered as a system; (2) DOE missions must be simplified; (3) Goals for downsizing must be clear and time frame mandated; and (4) Congress must refrain from becoming excessively involved in the downsizing effort and, instead, concentrate on policy, goal setting and progress assessment. Turning the DOE into an independent agency, transferring the four science labs to the NSF, and creating a closing commission to eliminate unnecessary and obsolete federal labs and regional offices will help reduce management inefficiencies, overhead, redundant activities, and regulations so that the DOE labs can focus on their core missions.

Dr. Vest testified that the laboratories should pursue work in areas identified as having long term national importance relevant to the DOE mission, and should be allocated through a merit-based competitive process. He stated that the primary role of national laboratories should be to operate unique experimental facilities that are of too large scale, or are too costly to be maintained by individual research institutions outside the federal sector. When thought is given to downsizing, expanding, or changing the mission of existing laboratories, merit-based competition should be introduced. This is likely to lead to establishment of modest-scale laboratories or centers in universities or other performing organizations.

Mr. McCorkle spoke in support of programs which facilitate the commercialization of dual-use technologies originated in the Department of Energy laboratory structure. He also spoke in support of H.R. 2142. He urged caution in the closure of DOE facilities and noted that they comprise the key element of our nation's scientific community, furthering basic research and playing a critical role in national security. He stated that commercialization doesn't replace the government-funded research in the laboratories, but rather enhances the value of the research by creating a "dual benefit." Mr. McCorkle said DOE should continue to develop core competencies and technical capabilities that strategically position them to contribute to the scientific and technological well being of the nation. He stated that this should include a continuation of their current role in national security, and should expand to include a greater contribution to the private sector.

Dr. Smith testified that the reduction of employment called for in H.R. 1510 and H.R. 2142 would have serious effects on the resources which support university scientists. He does not support H.R. 1993 language for directing cuts only toward civilian laboratories and activities in part because the defense labs also have non-defense functions which he says, by this logic, should also be cut. Dr. Smith criticizes H.R. 87 for its "unwieldy" process for eventually reaching lab closure and/or reconfiguration. He noted that DOE labs are so diverse in mission and function that a common set of criteria for reviewing and assessing their activities will be dif-

ficult to achieve. He spoke against the language in H.R. 2142 calling for an extensive set of criteria to be used in deciding which labs or programs to close or to consolidate. He noted that the publication of criteria in the Federal Register in advance of the decisions may create opportunities for delay, stretching out the process, and legal challenge to the action taken. Dr. Smith criticized H.R. 1993 questioning if the gains are sufficient to outweigh the inevitable confusion, disarray, and wheel-spinning that accompanies a major organizational change.

Panel 2

Dr. Bernthal discussed the importance of strengthening the partnership between the nation's distinguished research universities and its national laboratories. He spoke in favor of H.R. 2142 and he noted that the principles set forth in the bill reflect the conclusions of the Galvin Task Force. Dr. Bernthal testified that the research objectives of the national laboratories should be determined by the marketplace of ideas and the needs of the country. He suggests a corporate-style governing structure be created for DOE's major research laboratories and he said that if "privatization" means selling the laboratories to the highest bidder, then it is a non-starter. It is not clear who would buy the laboratories in an era when industry seems to be systematically reducing in-house research. If, on the other hand, "privatization" means developing an augmented "corporatized" GOCO system, that kind of privatization is appropriate. Dr. Bernthal recognized an important objective of H.R. 2142 and H.R. 1510 requiring laboratories to comply with existing regulatory law so to distinguish research centers from their "production" and related facilities.

Dr. Narath spoke in support of H.R. 2142 and discussed common weakness of H.R. 87 and H.R. 1993 creating a Facilities Commission to review and modify DOE's plan before the Department has demonstrated failure in aligning its laboratory system with its mission responsibilities. Dr. Narath stated that assigning laboratories specific missions may hinder their ability to progress toward becoming an effective system of laboratories. Dr. Narath testified against corporatization stating that it eliminates a linkage between the laboratories and the Executive Branch encouraging the Department to direct its funds elsewhere. He stated that a Board of Trustees is unlikely to be effective in resource allocation. He is supportive of the GOCO (Government-Owned, Contractor-Operated) model of laboratory management stating that it should be revitalized and restored. Any change to the laboratory system should preserve the joint agency responsibility and accountability for nuclear weapons.

Dr. Olesen stated that increasing economic productivity and enhancing the competitiveness of U.S. industry should not be a core mission of either DOE or the national laboratories. He testified that primary research missions of the national laboratories should be those that are not more effectively conducted by universities or private industry. He also testified that a clear mission focus in each laboratory will improve the performance of the laboratories both individually and as a system. He stated that DOE's core missions of energy, environment, national security, and fundamental science should be the primary focus of the national laboratories.

Dr. Olesen noted that rather than attempting to regulate the size of the work force, the government should hold laboratory management contractors accountable for achieving the scientific results and meeting the technology needs specified by the government. He also recommended revitalization of the GOCO model in contrast to the corporatization and privatization alternatives and stated that the GOCO model is highly effective in meeting government R&D needs.

Dr. King spoke in support of the GOCO model that ensures a greater level of contractor responsibility, autonomy and accountability to enable the national laboratories to fulfill their roles as efficient and cost-effective vehicles in support of national missions. He stated that the role of the DOE national laboratories should be mission-driven, keyed to national needs and issues, and focused on problems whose solutions require multidisciplinary expertise. He spoke in support of HR. 2142 but not H.R. 1510 because of its proposed one-third reduction. He stated that any decisions about the size and scope of the national laboratories should be made only after their missions have been clearly defined.

Panel 3

Dr. Gay fully supports DOE's national laboratory realignment activities. He stated that a comprehensive strategic plan is needed to define laboratory missions and to allocate resources to accomplish these missions. He spoke against privatizing facilities stating that they will not attract sufficient funding to effectively fulfill national missions. He also stated that improving the DOE national laboratory system involves the following steps: establish clear missions; prioritize research tasks and funding; assess core competencies of individual laboratories; assign specific missions; review and redefine governance structure; and define the best DOE oversight and laboratory management structure. NREL supports the "basic thrust" of H.R. 2142. Dr. Gay stated that H.R. 2142's core mission provisions could provide appropriate guidance to a commission which would review and evaluate all pertinent recent studies. In general Dr. Gay supports H.R. 87 and H.R. 1993 and the formation of an independent commission to make recommendations on reconfiguring and streamlining the DOE laboratory system but he says both bills are too narrowly focused. He also suggested that the bills: seek to facilitate the clear definition of laboratory missions; evaluate prioritization of laboratory work; assess whether current missions are being effectively accomplished; identify unnecessary overlap and application; ascertain whether any laboratories should be consolidated, reduced in size or scope, reconfigured or closed; and determine appropriate staffing levels for individual laboratories. Regarding H.R. 1510, the NREL supports elimination of self-regulation at DOE laboratories.

Dr. Hecker spoke in support of the importance of defining missions for the DOE laboratories. He noted that in addition to a compelling mission, it is imperative that the laboratories demonstrate cost effective operations. He does not favor establishing additional commissions or conducting more studies of the laboratories, nor does he endorse arbitrary size reduction. He suggests the path outlined in H.R. 2142 to define the missions of the laboratories and

then size them accordingly. He noted that three crucial research functions continue to be best performed by the DOE laboratories—nuclear weapons defined broadly, energy and environment, and a sharing of the fundamental research mission with other federal agencies. He noted that mission assignment for the individual laboratories should reflect their scientific and technical core competencies as well as the ability of the laboratory to satisfy specific customer requirements. Dr. Hecker spoke in support of the GOCO system of governance and noted that the system has eroded over time. He suggested the system be rebuilt based on the same fundamental principles.

Dr. Schriesheim testified that the mission of the Department of Energy is clearly stated in its strategic plan. He noted that one of the most important missions for DOE laboratories is the design, construction, and operation of user research facilities. He agreed that DOE improve the coordination of its basic sciences program with its energy technology programs. Dr. Schriesheim spoke in support of greater DOE coordination of basic science programs with energy technology programs and more partnerships with industry. He also supports elimination of self regulation.

Dr. Tarter stated the core mission areas of the DOE national laboratories: national security; energy; environmental science and technology; and underpinning fields of basic science. He testified that each major DOE laboratory needs to have a defining purpose which will cause the laboratories to appropriately "size" themselves as the mission and program definitions are refined, and as the management requirements are restructured. Dr. Tarter supports the GOCO laboratory arrangement and stated that every effort should be made to retain and improve it.

Dr. Trivelpiece expressed concern about lab closures and the private sectors decreased investment in research. He also spoke in support of the GOCO concept.

Dr. Crawford supports R&D partnerships with industry, universities, and other federal laboratories. He testified that realignment of the DOE laboratories is necessary, but should be driven by mission requirements and best business practices. He said that it is unwise to prescribe an explicit size and personnel limitation (as H.R. 1510 would mandate) and to make closure recommendations before missions have been mapped to resources and facilities. He is supportive of H.R. 2142 and concerned that as missions are defined for the laboratories, a trend toward finer and finer differentiation among missions might eventually move the multiprogram laboratory system in the direction of very narrowly defined, single-mission laboratories. Dr. Crawford spoke in support of the GOCO system.

4.3(d)—Scientific Integrity and Public Trust: The Science Behind Federal Policies and Mandates, Case Study 1—Stratospheric Ozone: Myths and Realities

September 20, 1995

Hearing Volume No. 104-31

Background

On September 20, 1995, the Subcommittee on Energy and Environment held the first in a series of hearings to receive testimony on the use of scientific research by agencies under the Subcommittee's jurisdiction in the formulation of federal policies and mandates. The hearing, entitled, "Scientific Integrity and Public Trust: The Science Behind Federal Policies and Mandates, Case Study 1—Stratospheric Ozone: Myths and Realities," focused on the science behind the accelerated timetable for the phase-out of anthropogenic compounds, including chloroflorocarbons (CFCs) and methyl bromide, suspected of depleting the Earth's stratospheric ozone layer.

The witnesses included: Congressman Tom Delay and Congressman John T. Doolittle and two panels.

Panel one testified on science issues and included: Dr. Robert T. Watson, Associate Director of Environment at the Office of Science and Technology Policy; Dr. S. Fred Singer, President of the Science and Environment Policy Project; Dr. Daniel L. Albritton, Director of the Aeronomy Laboratory of the Environmental Research Laboratories of the national Oceanic and Atmospheric Administration; Dr. Sallie Baliunas, Senior Scientist at the George C. Marshall Institute; Dr. Richard Setlow, Associate Director of Life Sciences, Brookhaven national Laboratory; and Dr. Margaret L. Kripke, Professor and Chairman of the Department of Immunology at the University of Texas M.D. Anderson Cancer Center.

The second panel focused on economic, regulatory and policy issues and consisted of: the Honorable Mary Nichols, Assistant Administrator for Air and Radiation at the Environmental Protection Agency; Mr. Kevin Fay, of the Alliance for Responsible Atmospheric Policy; Mr. Ben Liebermann, Environmental Research Associate for the Competitive Enterprise Institute; Professor Richard L. Stroup, Senior Associate for the Policy Economy Research Center; and Dr. Dale Pollet, Project Leader for Entomology at the Louisiana Cooperative Extension Service.

Summary of hearing

Congressman Doolittle testified in opposition to accelerating the phase-out date for CFCs from 2000 to 1996. According to Congressman Doolittle, the scientific evidence to date does not justify the accelerated ban, which takes affect on December 31, 1995, for a number of reasons: NASA retracted its 1992 findings that an ozone hole was likely to open over North America; astronomical costs are associated with a ban on CFCs; flaws are present in EPA's cost-benefit analysis; and safe CFC replacements are not readily available.

Congressman Delay also questioned the science behind the CFC ban, as well as the connection between ozone depletion and current increases in skin cancer rates. In addition, he expressed concern

about the unknown environmental impact of CFC replacements and the costs to the American family associated with CFC phase-out.

Panel 1

Dr. Watson presented what he termed the scientific consensus of the overwhelming majority of the international scientific community on ozone depletion. He stressed the critical importance for sound science and risk assessment as the basis for regulatory policy on environmental issues. Dr. Watson highlighted the dangers of increased ultraviolet-B radiation (UV-B), including melanoma and non-melanoma skin cancers, eye cataracts, and possibly suppressed immune-response. According to Dr. Watson, an increase in ground UV-B can be attributed to stratospheric ozone depletion resulting from human activity, specifically the use of CFCs. However, he also stated that more evidence is needed to clearly establish a trend of increased ultraviolet radiation at the Earth's surface and also to determine whether there is a direct relationship between UV-B and melanoma.

Dr. Singer supplied examples of the lack of scientific integrity underlying the ozone issue and cases where the science was manipulated in such a way to yield "certain political objectives." According to Dr. Singer, accelerated phase-out of CFCs is based upon a CFC-ozone theory that has never been proven. Dr. Singer, who supports the original phase-out date of 2000, testified that a longer record is necessary to isolate natural variations, including the solar cycle, from the data before concluding there is a long-term trend indicating a decline in stratospheric ozone. He cautioned that evidence indicating an increasing trend in UV-B radiation and resulting harmful health effects is based on mathematical models, not direct measurements. He emphasized that non-melanoma skin cancer resulting from changes in ozone cannot be deduced from the evidence to date. He agrees with Dr. Setlow, that skin cancers, in general, have increased over the last 60 years as a result of a change in lifestyle and not changes in UV or ozone levels.

In addition, Dr. Singer highlighted his experience with those within the scientific community who do not agree with the current theory but do not speak up for fear of losing research funding. He also expressed concern over the potential harm to the economy as a result of the accelerated phase-out date and the practice of "science by press release."

Dr. Albritton testified on the impact of human activities on the stratospheric ozone layer. He addressed the findings of "Scientific Assessment of Ozone Depletion: 1994," summarizing the current viewpoint on ozone depletion. He stated that there is no doubt among the vast majority of scientists that man-made compounds destroy stratospheric ozone and have led to the creation of an ozone "hole" over the Antarctic. He conceded that at present there is no documented long-term increasing trend in UV levels and that some fluctuation in the level of ozone can be attributed to natural processes.

Dr. Baliunas noted the difficulty of measuring the impact of anthropogenic factors on the ozone layer, citing natural variability of ozone levels and other natural factors which make it difficult to de-

duce an anthropogenic trend. She also noted the difficulty of establishing long-term trends in existing UV-B exposure data. Dr. Baliunas believes that a five year delay in phase-out of CFCs, back to the original date of 2000, would result in an insignificant UV-B increase when compared to natural fluctuations. She further stated that such small UV-B increases should not be regarded as a significant threat to public health. She feels that more research should be conducted to measure ground-level UV-B and assess the environmental and health impacts of CFC replacement chemicals. Dr. Baliunus informed members of the Committee of her experience with federal funding agencies that had discouraged her from applying for funding to study subjects that might question conventional wisdom on ozone depletion. The Chairman asked her to submit a letter detailing efforts by groups inside and outside government to stifle discussion of the issue.

Dr. Setlow testified on the health effects attributed to the increase of UV exposure due to decreases in stratospheric ozone. He highlighted findings from experiments with UV radiation on mice and tropical fish. According to Dr. Setlow, "the results from studies on fish, if extrapolated to humans, indicate that any ozone depletion and attendant UV-B increase will have only a small effect on melanoma induction." Dr. Setlow attributed the current four to five percent a year increase in skin cancer to changes in lifestyle and not ozone depletion. Further, he testified that the use of sunscreens, which inhibit the absorption of UV-B to prevent sunburn (but encourage individuals to extend exposure to the sun) lead to increased exposure to UV-A, increasing the risk of melanoma. In addition, he testified that skin cancer is the result of chronic exposure to the sun's radiation, rather than instantaneous exposure to increased levels of radiation, as from an event such as the ozone hole.

Dr. Kripke presented data from 20 years of research focusing on the role of UV-B radiation in both basal and squamous cell cancers of the skin, cataracts, and suppression of the immune-response system. According to Dr. Kripke, a full understanding of the contribution of ultraviolet radiation to melanoma cannot be estimated from current data. She stated that if UV-A is the principal cause of melanoma, then the impact of ozone depletion on melanoma skin cancer rates is limited. She believes more research on the effects of UV-B radiation, specifically on immune response and melanoma, as well as the health effects of replacement compounds, is necessary.

Panel 2

Ms. Nichols focused on the scientific basis for accelerating the phase-out and the resulting economic impact. She testified that the decision to move to an accelerated phase-out date for CFCs rests on an overwhelming consensus of the scientific community, economists, and business leaders. She disagreed with the Competitiveness Enterprise Institute's (CEI) estimate of the $45-$100 billion cost to the economy from the phase-out of CFCs. Ms. Nichols admitted that questions still exist as to what level of exposure causes an increase in skin cancer. According to Ms. Nichols, EPA has the support of the White House to work on language to give an "essen-

tial-use exemption" for agricultural uses of ozone-depleting compounds which have no substitutes.

Mr. Fay testified on behalf of 250 industry members on the need to maintain economic competitiveness during the transition from CFCs to their substitutes. He testified that the scientific basis for phase-out of CFCs is credible and has remained basically unchanged since the original policy decision to phase-out production of the compound. According to Mr. Fay, producer industries have acted responsibly and quickly to develop and implement safe and effective substitute technologies that allowed the phase-out to be accelerated. As a result of quick action by industry, further restrictions to other compounds, such as HCFCs, are unnecessary. However, he feels much still needs to be done internationally in order to ensure full compliance with the Montreal Protocol, including completion of CFC phase-out in developing countries and better enforcement against the trade of illegally imported CFCs. He believes the black market on CFCs will fade if Congress eliminates the excise tax of $5.35 on the compounds.

Mr. Liebermann testified on the consumer impact of the accelerated CFC-phase-out. According to Mr. Liebermann, American consumers will face a disproportionate share of the cost associated with CFC-phase-out. U.S. consumers will spend $2 billion more annually to repair their car air conditioners as a result of the accelerated phase-out date. In addition, other nations are not strongly enforcing the phase-out, allowing a black market for CFCs to go unchecked. Mr. Liebermann stated that acceleration of CFC-phase-out will exacerbate costs due to large volumes of existing equipment requiring premature replacement or retrofitting; continuing technological bugs with substitute refrigerants and equipment; and uncertainty about the safety of CFC substitutes. He also stated that equipment requiring CFCs is more efficient than comparable non-CFC systems.

Professor Stroup testified on the importance of proper policy decision-making on CFCs with regard to the gains claimed and the sacrifices imposed by such policies. He asked, "Will the known costs and the added risks that we force onto Americans by banning CFCs rapidly be counter-balanced or offset by the benefits of reduced stratospheric ozone depletion?" An overestimate of one risk relative to others, cited by Professor Stroup, involved the original asbestos-containing putty used to seal the O-ring system of the Space Shuttle Challenger. Despite a proven track record of safety and effectiveness, the asbestos putty was replaced by an asbestos-free putty after asbestos was banned. The new putty contributed to the tragic loss of the Challenger. According to Professor Stroup, CFCs, like asbestos, can be replaced, but not without sacrificing many benefits, such as safe, cheap refrigeration which increases food safety.

Dr. Pollet addressed the negative economic, nutritional, and environmental impacts of a methyl bromide-phase-out. According to Dr. Pollet, the U.S. Department of Agriculture studied 21 crops in five states and projected $1.5 billion in direct economic losses from a ban on methyl bromide. The ban on methyl bromide will also contribute to the loss of American food production independence since many farmers will not be able to compete in world markets. Environmental impacts of the methyl bromide phase-out will include

harm to reforestation efforts as well as the increased use of dangerous pesticides. At present, farmers do not have alternatives to methyl bromide. It will require 10 or more years and $50 to $100 million to develop a viable substitute. Dr. Pollet estimated that even if there were no scientific uncertainties about methyl bromide's impact on the ozone layer, the most optimistic environmental benefits would not be greater than the damage incurred from phase-out.

4.3(e)—Next Generation Weather Radar (NEXRAD): Are We Covered?

October 17, 1995

Hearing Volume No. 104-25

Background

On October 17, 1995, the Subcommittee on Energy and Environment held an oversight hearing entitled, "Next Generation Weather Radar (NEXRAD): Are We Covered?" on the national Weather Service's (NWS's) current plan for modernization focusing on Next Generation Weather Radar (NEXRAD) coverage for the United States. Witnesses offered their assessments of two recently released reports, "Toward a New national Weather Service: Assessment of NEXRAD Coverage and Associated Weather Services," by the national Research Council (NRC); and "Weather Forecasting: Radar Availability Requirement Not Met," by the United States General Accounting Office (GAO), which identify areas in the United States that may receive less-than-optimal coverage under the Department of Commerce's Fiscal Year (FY) 1996 national Implementation Plan For the Modernization of the national Weather Service (NWS).

The witnesses included: Congressman Steve Buyer, Congressman Phil English, Congressman George W. Gekas, Congressman Wally Herger, Congressman Mark E. Souder, and Congressman William M. Thornberry, who all testified on the effect of the modernization efforts on their districts. Also testifying were Dr. Joe Friday, Director of the national Weather Service, NOAA; Mr. William Gordon, Chairman of the NEXRAD Panel of the national Weather Service Modernization Committee of the national Research Council; and Mr. Jack L. Brock, Jr., Director of the Defense Information Management Division of the United States General Accounting Office.

Summary of hearing

Congressman Buyer expressed concern for the potential degradation of service associated with the closure of local weather service offices. He proposed using Federal Aviation Administration (FAA) NEXRADs, originally designated to provide spare parts for existing radars, and siting the new system at the Grissom Air Reserve Base in Northern Indiana.

Congressman English testified on the impact of the modernization on weather services near Lake Erie. The Erie region, an area with variable weather which is often difficult to predict, was identified by the NRC as one of five areas within the United States

where NEXRAD coverage might be inadequate. Congressman English indicated that defects in the new system, which include the distance of the NEXRAD from the forecast area; less than optimal ASOS (Automated Surface Observing System) performance; and the replacement of professional staff with less experienced subcontractors, could significantly affect the safety of the Erie region.

Congressman Gekas indicated his skepticism for the ability of a new NEXRAD to deliver adequate weather coverage to Harrisburg, Pennsylvania. He believes the NWS disregarded a radar gap resulting from the positioning of a NEXRAD 115 miles north of the Harrisburg metropolitan area on Rattlesnake Ridge in Black Moshannon State Park. He asked the Committee to address the situation created by the NWS and urged members to rectify any degradation of weather forecasting.

Congressman Souder urged the Committee to direct the NWS to modify its modernization plan. He believes the plan should be reconciled with the NRC conclusion that some areas could experience degradation of service and additional NEXRAD units should be commissioned. He testified that northeast Indiana and northwest Ohio experience the second highest rate of tornado-related deaths and frequent microburst wind damage. He suggested optimum placement of a new site would be in northeast Indiana instead of northcentral Indiana.

Congressman Herger reiterated the modernization plan's shortcomings and the risks it may pose to public safety. According to Congressman Herger, an area north of Redding, California, due to its unique geography, will experience degradation in weather service after the closing of the Redding office. Congressman Herger highlighted the services provided by the Redding office to Northern California, which include flood and wildfire forecasting as well as weather forecasting for the busy Interstate-5 corridor. He suggested placing a NEXRAD in Red Bluff, just south of Redding.

Congressman Thornberry testified on problems associated with the 15 Department of Defense (DOD)-operated radars around the country, which, according to the NRC, do not satisfy the same standards as the NWS-operated radars. At the Congressman's suggestion, representatives from the Air Force, NWS, local telephone companies, and long distance carriers were called together to discuss the reliability of radar coverage for North Texas. The NRC identified problems which can potentially cause the entire radar to shut down without warning, including downed phone lines and the lack of back-up power. In addition to problems within the radar system, he expressed concern for the large areas sometimes covered by a single NWS forecast office.

Panel 1

Dr. Friday testified that although the country is already enjoying benefits from modernization, much still needs to be done in order to reach the new system's full potential. NOAA contracted the NRC to identify where possible degradation of service could occur as existing radars are decommissioned. The Commerce Secretary then put together a team to move beyond the NRC findings and consider the total network before determining the potential for service degradation. The Secretary's report, scheduled to be submitted to Con-

gress in November, will respond to NRC recommendations. One of the recommendations concerned the critical contribution of the DOD NEXRADs to the nation-wide network and the need to ensure operational availability of all NEXRADs in the network. Increasing the timeliness of NWS warnings, NEXRADs are one of the cornerstones of the NWS modernization and part of a national network which will provide a significant improvement over the present radar network. The Secretary's team will also develop recommendations of its own related to NWS modernized operations.

Dr. Friday stated that the NWS is already addressing concerns over the Automated Surface Observing System (ASOS), in conjunction with the FAA and the aviation community, by contracting human observers to augment the system until technical issues are resolved. He justified acquisition of the surplus FAA radars in anticipation of a possible requirement to add a small number radars to the system. Money will be saved whether the FAA NEXRADs are used for radars or spare parts when compared to the expense of new radars or spare parts. According to Mr. Friday, if the Secretary's report recommends additional radars, they would be in place and running in 18 to 24 months. In addition, although the implementation plan calls for reducing the number of NWS offices from 300 to 118, only six offices have gone through the certification process to be closed and staff has been adjusted in only a few areas.

Dr. Gordon and Mr. Floyd Hauth, Study Director for the Committee on the Modernization of the NWS, testified on the Panel's recommendations, as well as suggestions for evaluation procedures and criteria for use in site-by-site evaluations of radar coverage. Mr. Gordon presented the conclusion of the NEXRAD Panel of the national Weather Service Modernization Committee (NWSMC) that "weather services on a national basis will be improved substantially under the currently planned NEXRAD network." He stated that the new radars would be far more powerful and sensitive than the old radar system. In areas where the pre-NEXRAD radar is not replaced and service is to be provided by a NEXRAD located some distance away, the panel's analyses show that there is a potential for some degradation in radar-detection coverage capability. However, according to Mr. Hauth, the Panel did not recommend locating NEXRADs where each pre-existing radar was formerly located. Due to topographic obstacles, in some cases it may be better to locate the NEXRAD at another site and look at the detection capabilities of the radar once the national network is in place.

According to Dr. Gordon, degradation of radar-detection coverage doesn't necessarily mean degradation of weather service in the forecasting and warning functions when you consider the entire system. Degradation of associated warning services must be compensated for by other improvements in the system through modernization.

Mr. Brock stated that a modernized weather service will improve national radar coverage, but emphasized important questions remain regarding possible gaps in the current siting scheme. He testified that from 20 to 35 percent of Air Force NEXRAD sites are still falling short of the availability requirement each month despite the initiation of steps by the Air Force and NWS to imple-

ment GAO recommendations. According to Mr. Brock, NEXRADs lack an uninterruptible power supply (UPS) to protect against power outages. The NEXRAD program office did not expect loss of power to be a significant risk. NWS and the Air Force now plan to retrofit their respective NEXRADs with an UPS capability at an estimated cost of $125,000 per radar, but do not call for all sites to receive these retrofits until Fiscal Year 2002. Mr. Brock stated the NWS bought two FAA NEXRADs which would provide spare parts and save $900,000. If the NWS determines that additional NEXRADs are needed, the program office estimates $3.8 million will be required to convert the two FAA radars into four systems, making the total price for four NWS NEXRADs about $8.4 million. This is one-third the amount the NWS would have to spend to buy equivalent new systems. However, as funds allocated for UPS retrofit were used for purchase of the FAA NEXRADs, retrofit completion has been delayed.

4.3(f)—Scientific Integrity and Public Trust: The Science Behind Federal Policies and Mandates, Case Study 2—Climate Models and Projections of Potential Impacts of Global Climate Change

November 16, 1995

Hearing Volume No. 104-35

Background

On November 16, 1995, the Subcommittee on Energy and Environment held the second in a series of oversight hearings to receive testimony on the use of scientific research and data by agencies under the Subcommittee's jurisdiction in the formulation of federal policies and implementation of federal mandates. The hearing, entitled, "Scientific Integrity and Public Trust: The Science Behind Federal Policies and Mandates, Case Study 2—Climate Models and Projections of Potential Impacts of Global Climate Change," focused on climate models and their uses and limitations in projecting changes in the global climate and impacts associated with those changes.

Witnesses were arranged into two panels. Panel one included: Mr. Peter F. Guerrero, Director of Environmental Protection Issues for the Resources, Community, and Economic Development Division of the United States General Accounting Office (GAO); Dr. Jerry Mahlman, Director for the Geophysical Fluid Dynamics Laboratory at the national Oceanic and Atmospheric Administration (NOAA); and Dr. Patrick Michaels, Associate Professor in the Department of Environmental Science at the University of Virginia.

Panel two consisted of: Dr. Robert T. Watson, Associate Director of Environment in the Office of Science and Technology Policy; Dr. William A. Nierenberg, Director Emeritus at the Scripps Institution of Oceanography; Mr. David Gardiner of the Office of Policy, Planning, and Evaluation at the Environmental Protection Agency (EPA); Dr. Thomas Gale Moore, Senior Fellow at the Hoover Institution of Stanford University; and Dr. Robert W. Corell, Assistant Director for Geosciences at the national Science Foundation, and Chairman of the Subcommittee on Global Change Research.

Summary of hearing

Panel 1

Mr. Guerrero presented the testimony of GAO based on the July 1995 GAO report, "Global Warming: Limitations of General Circulation Models and Costs of Modeling Efforts." According to Mr. Guerrero, although general circulation models are the most highly developed tools available to develop understanding of the global climate's response to greenhouse gas emissions, the models remain limited in their ability to estimate future climatic changes. These limitations stem from scientists' imperfect understanding of the climate system and computers' insufficient capacity to perform the detailed calculations needed to make more precise estimates. However, efforts are underway to improve the accuracy of the models including incorporation of more of the processes affecting the climate system—particularly cloud formation processes—and better reflect interactions among various components of the climate system. Scientists are also developing larger and faster computers to manipulate data for longer periods of time and to better understand regional effects. According to Mr. Guerrero, the ability to model will continue to improve, but there will never be one hundred percent certainty. Even if scientists completely understood the physical processes they are modeling and the climate systems themselves, and they do not, unvalidated assumptions regarding emission rates, population growth, and technology development would still have to be used by the modelers.

Dr. Mahlman presented the estimated climatic effects in the year 2050 from the projected increase in greenhouse gases. According to Dr. Mahlman, information was derived from the strengths and weaknesses of climate models, climate theory, and widespread observations of the climate system. His assessment of the change in climate by the middle of the next century included several predictions with varying levels of confidence. According to Dr. Mahlman, although there are no more credible counter-hypotheses to the assertion that the observed warming over the last century is attributed to the greenhouse effect, scientists cannot say with absolute certainty that the observed temperature change over the last century can be ascribable to anthropogenic factors. He emphasized that understanding cloud response is still the most serious barrier to more confident predictions about climate warming. Also, it is uncertain whether a warmer, wetter atmosphere could lead to increased intensities of tropical storms. According to Dr. Mahlman, the predicted warming to date is not yet large compared to natural climate fluctuations, which on short time scales, can mask greenhouse warming signals. In addition, the presence of sulfate aerosols, from industrial pollution, exerts a previously unquantified cooling effect on the planet. As a result of our increased understanding of the offset due to sulfate aerosols, the predicted rate of global warming has decreased. With respect to predicting impacts associated with global warming, Dr. Mahlman warned "the state of knowledge of the wide range of possible impacts and costs of climate change is far less certain than are the predictions for the climate system." He emphasized that without a better climate-change

measuring system, research and predictions can not be properly evaluated.

Dr. Michaels testified that recent reports which claim serious ecological consequences as a result of global warming are based upon models that are now known to have greatly overpredicted the extent of greenhouse warming. According to Dr. Michaels, new calculations support the view of scientists who predicted that global warming would be relatively modest. Older calculations were the basis for the 1992 Framework Convention on Climate Change and known, even at that time, to greatly overestimate warming. The record of temperature measurements from the atmosphere show no net temperature change from 1977 through 1994, and there is no net change from the beginning of the record in 1965 to 1976. The temperature increase appears to have occurred between 1976 and 1977. No model will ever show such a one-time warming spike. The most important development in the last two years is that it is now acknowledged that if global warming occurs at all, it will be a very modest. In Dr. Michaels' opinion, the lower part of the projected global warming, on the order of 1 to 4 degrees Celsius, is not cause to implement risky economic policy.

Panel 2

Dr. Watson testified that climate change is likely to have a "wide-ranging and mostly adverse effect on human health, with significant loss of life." His testimony was based on findings from the Intergovernmental Panel on Climate Change (IPCC) Working Group II's present state of understanding of the climate system. According to Dr. Watson, theoretical models that take into account increased greenhouse gas and sulfate aerosol concentrations simulate observed changes in surface temperature and vertical temperature distribution, suggesting that human activities are implicated in the observed changes in the Earth's climate. The IPCC Working Group II concluded that human health, ecological systems, and socio-economic sectors are all vulnerable to climate change. However, many of the impacts are difficult to quantify because existing studies are limited in scope. In answer to questions by the members about the peer-review of the IPCC document, Dr. Watson indicated the present system is not perfect, but probably the best that can be expected at this moment in time. Dr. Watson believes significant reductions in greenhouse gas emissions are technologically possible and economically feasible.

Dr. Nierenberg emphasized his certainty that the current anthropological growth of CO2 in the atmosphere will influence the climate. However, when, how much, and the nature and magnitude of the effects remain uncertain. More significant than the change in the average global surface temperature change is the knowledge of the change in the statistical behavior of regional quantities such as rainfall, storm frequency and intensity, flooding, coastal storm surges and so on. He stressed that a significant weakness of the approximately fifteen climate models worldwide is demonstrated in a spread of temperature rise between 1.5 and 4.5 degrees centigrade for an anticipated doubling of atmospheric CO2. In addition, the coupled ocean-atmosphere model has provided better insight into the decay time of excess anthropogenic CO2 in the atmos-

phere. According to Dr. Nierenberg, the exponential lifetime for the disappearance of excess CO2 in the atmosphere is now approximated at between 50 and 160 years, down from the 1000 years proposed at the time of the 1983 national Atmospheric Studies (NAS) report. With this in mind, Dr. Nierenberg believes policymakers can now safely wait until the science behind climate changes becomes clearer before taking action.

Mr. Gardiner testified on EPA's assessment of sea level rise. According to Mr. Gardiner, estimates of sea level rise vary substantially by locality. Both the IPCC and the EPA reports note that the latest estimates of sea level rise are lower than previous estimates, primarily due to lower estimates of global temperature change.

Dr. Moore testified that it is unquestionable that the Earth's climate will change. He suggested that although the evidence supporting the claim that the earth has grown warmer is shaky, if warming occurs it is more likely to bring net benefits to Americans and most of the world. According to Dr. Moore, it is well documented that the Earth's climate has changed with time. Warmer periods in the past have been beneficial to the human race. With global warming, longer growing seasons and increased agricultural output would result from increased precipitation and milder temperatures. In addition, increased CO2 would also boost forest productivity by 20 percent and warmer temperatures will also mean fewer and less violent storms. Dr. Moore emphasized the declining influence of climate on human activities with the growth in wealth and resources. According to Dr. Moore, modern society is less dependent upon farming, principally affected by a change in climate. Today's society has developed a more industrial base, boosting immunity to temperature variations. Dr. Moore believes the way to deal with potential climate change is to promote growth and prosperity which would provide the needed resources to adapt to changing temperatures. According to Dr. Moore, the worst aspect of global warming would be a rise in the sea level, which could be costly, but can be dealt with if necessary. He explained that policymakers would have to consider preventative measures only if warming should create more difficulties than benefits in the future.

Dr. Corell testified on the research strategies that underlie climate modeling efforts and the research strategies that support studies on impacts of climate change. He stated the present climate change models are the best tools available to provide insight into what may happen to the planet if emissions of greenhouse gases continue to grow. According to Dr. Corell, the goal of the climate change program is to provide credible, state-of-the-art, global modeling capability. Computer models enable tracking of the important complex interactions and are used to sharpen the understanding of key factors guiding the behavior of the planet's weather. The integrated mathematical-based models bring together scientific understanding of winds, air pressure, ocean currents, temperature, salinity, water vapor, clouds, solar and infrared radiation, precipitation and evaporation, and other factors. At present, current models are still not able to predict important regional issues. Dr. Corell emphasized the importance of increasing computational capabilities in order to improve the finer-scale resolution of climate models. In addition, Dr. Corell testified there are currently 11 federal agencies

sharing an annual budget of $1.8 billion to study global climate change because no single agency has the resources necessary to attack such a complex problem on its own.

4.3(g)—Superfund Research and Development: The Role Of R&D Within A Reformed Superfund

December 6, 1995

Hearing Volume No. 104-37

Background

On December 6, 1995, the Subcommittee on Energy and Environment held a hearing entitled, "Superfund Research and Development: The Role Of R&D Within A Reformed Superfund," to evaluate the effectiveness of the Superfund Research and Development (R&D) program and review its role under a reformed Superfund. The hearing also examined whether R&D is the best use of funding from the Hazardous Waste Trust Fund. The fund's primary purpose is the cleanup of contaminated sites. The R&D program, currently funded at roughly $60 million a year, is reauthorized in H.R. 2500, the Reform of Superfund Act of 1995.

Witnesses included: Dr. Robert J. Huggett, Assistant Administrator for Research and Development at EPA; and Mr. Lawrence J. Dyckman, Associate Director of Environmental Protection Issues for the Resources, Community, and Economic Development Division of the United States General Accounting Office (GAO).

Summary of hearing

Dr. Huggett testified on the research performed in EPA's Office of Research and Development (ORD). According to Dr. Huggett, the Superfund research done by ORD strives to improve site characterization, risk assessment methods, and the cost-effectiveness of remediation technologies. The program is currently funded at approximately $60 million (for FY 1995) which supports 146 scientists, engineers and staff. Dr. Huggett described the process by which innovative technologies are selected for testing at contaminated sites identified by EPA. Dr. Huggett also explained that the EPA will continue to work with the DOE labs and increase collaboration with the academic community. He praised EPA's Superfund R&D program, giving special emphasis to the Superfund Innovative Technology Evaluation (SITE) program. Dr. Huggett noted that some changes to the Superfund R&D program are warranted. Specifically, he expressed his support for making all funding for the Superfund academic research centers competitive.

Mr. Dyckman testified on GAO's review of EPA's Superfund R&D program. Specifically he discussed EPA's use of innovative technologies at Superfund sites, which factors limit the use of innovative technologies, and how EPA's SITE program encourages the development and use of innovative technologies at Superfund sites. Mr. Dyckman described the 1992 GAO review of SITE which identified significant problems within the program. According to the report, SITE only provides testing for new technologies under limited conditions, making it difficult to assess the wide-scale applicability

of these new technologies. In addition, EPA selected an innovative technology in only about 20 percent of all cleanups in 1994 and only a few technologies, including soil vapor extraction, thermal desorption, and fire remediation, account for almost half of the new technologies in use. Mr. Dyckman questioned whether EPA has identified enough technologies to be of benefit to the Superfund program as a whole. According to Mr. Dyckman, regulatory barriers, technical limitations of innovative technologies, lack of sufficient cost and performance data, and the lack of incentives for private industry to invest in innovative technology have all inhibited the further development and widespread use of innovative technologies at Superfund sites. In terms of regulatory barriers, Mr. Dyckman believes a softening or elimination of Applicable or Relevant and Appropriate Requirements (ARARS), the state regulatory framework for Superfund, would benefit the innovative technology program.

4.3(h)—Scientific Integrity and Public Trust: The Science Behind Federal Policies and Mandates, Case Study 3—EPA's Dioxin Reassessment

December 13, 1995

Hearing Volume No. 104-39

Background

On December 13, 1995, the Subcommittee on Energy and Environment held the third in a series of oversight hearings to receive testimony on the use of scientific research and data by agencies under the Subcommittee's jurisdiction in the formulation of federal policies and implementation of federal mandates. The hearing, entitled, "Scientific Integrity and Public Trust: The Science Behind Federal Policies and Mandates, Case Study 3—EPA's Dioxin Reassessment," focused on the scientific foundation underlying the Environmental Protection Agency's (EPA) reassessment of the health effects associated with dioxin compounds. Concerns have been raised that chapter nine of the reassessment document, which focuses on health effects, has been based upon "regulatory policy" and not "matters of scientific fact."

The witnesses were arranged into two panels. Witnesses on panel one included: Dr. William H. Farland, Director for the national Center for Environmental Assessment of the Office of Research and Development at the Environmental Protection Agency; Dr. Michael Gough, Former Government Expert Member of the Dioxin Reassessment Review Committee of the EPA Science Advisory Board; Dr. George W. Lucier, Director of the Environmental Toxicology Program at the national Institute of Environmental Health Sciences; and Dr. Kay H. Jones, President of Zephyr Consulting.

Panel two consisted of: Admiral Elmo E. R. Zumwalt, Jr., USN (ret.), Agent Orange Coalition.

Summary of hearing

Panel 1

Dr. Farland testified on the conclusions of the EPA Science Advisory Board (SAB) from its review of EPA's reassessment of dioxin. The SAB found that the scientists concurred on a series of possible human biochemical, cellular and tissue-level biological changes occurring from exposure to dioxin-like compounds. According to Dr. Farland, "based on all the data reviewed in this reassessment and scientific inference, a picture emerges of TCDD and related compounds as potent toxicants in animals with the potential to produce a spectrum of effects in animals, and, perhaps, in humans." Despite this he explained, "there is currently no clear indication of increased disease in the general population attributable to dioxin-like compounds." Dr. Farland also conceded EPA's risk characterization includes high levels of exposure to animals, but only limited human information. He informed the Committee that EPA will now look at alternative models to the linear model, which may exaggerate and overestimate cancer risks associated with exposure to dioxin, and write it into the risk characterization portion of the reassessment. Finally, in the future, Dr. Farland recommends outside peer-review of other EPA reassessment documents.

Dr. Gough testified on the inconsistency between the scientific findings in the earlier chapters and the analyses and conclusions in chapters 8 and 9 of the reassessment. Dr. Gough stated his opinion that conclusions from the EPA document are inadequate and do not provide direction for research or decision making. According to Dr. Gough, there are recurring faulty themes in the review committee's report to the SAB. First, EPA added the estimated toxicity of all dioxin-like molecules together. Also, EPA derived toxicity data at high dose levels and failed to adequately describe its methods for extrapolating lower dosage risks. In addition, EPA failed to factor the Ah-recepter, which may bind with dioxin to produce the toxic effects, or any other receptor into EPA's risk assessment. Further, if one of the models had included a receptor, that model would predict a non-linear and/or a threshold containing dose response curve, producing risk estimates lower than those produced by EPA. At present, EPA is using a linear model which it says exaggerates and overestimates the cancer risk. According to Dr. Gough, the linear model produces a response which is generally regarded as "very improbable." Finally, EPA classifies dioxin as a complete carcinogen, including all the steps that lead to cancer. In addition to these themes, Dr. Gough emphasized that EPA's estimation of human risk (at low levels of exposure to dioxin) were based on extrapolating results from data on animals exposed to high doses of the toxin. After examination of EPA's tables in chapter 9, which indicate that most toxic effects in animals occur at doses 100 to 100,000 times higher than human exposure rates, Dr. Gough concluded that there is an ample margin of safety for humans. Further, Dr. Gough cited the review committee's conclusion that, "the only human effect that is clearly established as being related to TCDD [dioxin] exposure" is chloracne. This contradicts EPA's conclusion that segments of the population might be suffering multiple adverse effects from dioxin exposures. Finally, Dr.

Gough referred to the Ranch Hand study and the underscoring of the areas in which there was a negative response to dioxin, including the immune and other biological systems, which were not indicated in the risk characterization portion of the reassessment. In the future, he hopes that EPA will "exercise more discipline in its selection of data" and do a better job "of presenting its explanations and its decision making process."

Dr. Lucier testified in support of the EPA SAB review of the dioxin reassessment. He believes that the information in the reassessment provides evidence that we should be concerned about current levels of human exposure to dioxin chemicals. He states, "my bottom lines on hazard identification are that dioxin should be considered a probable human carcinogen and that non-cancer effects of dioxin and related compounds are of public health concern." He agrees with the risk characterization which identifies dioxin as a public health concern at current exposure levels, but hesitates to put a quantity on the level of concern. Dr. Lucier stated he would like to see a clearer explanation of the "known" and "unknown" regarding the health effects of dioxin exposure in the finalized risk assessment chapter. He also expressed desire for a review of the process EPA has undertaken and an interest for streamlining the process to be more time efficient.

Dr. Jones testified in nearly complete agreement with the EPA SAB review of the dioxin reassessment, but expressed some concerns regarding EPA's misuse of their non-peer reviewed documents for regulatory purposes. According to Dr. Jones, technical hypotheses must meet the peer review test in order to be considered "science" and EPA cannot exempt itself from the same standards of peer review imposed on scientists outside of government. He believes that in order to ensure "scientifically valid and balanced risk analyses in the future," strict procedures for peer review are necessary if EPA is to be allowed to continue performing both risk assessments and regulatory functions. He emphasized that the background and exposure chapters were done by internal staff at EPA and not subject to the same outside input as the toxicology chapters with which Dr. Jones was directly involved. In addition, Dr. Jones expressed his curiosity as to why the United States has taken a totally independent approach to dealing with dioxin risks and why EPA is treating dioxin as a zero-threshold pollutant.

Panel 2

Admiral Zumwalt testified with concern over what he believes is the practice of constructing panels of "scientists with obvious conflicts of interest" to evaluate studies on Agent Orange and dioxin. According to Admiral Zumwalt, the panel assigned with reviewing the draft reassessment of dioxin by EPA contained members and consultants from the scientific community "who have a strong interest in finding negative correlation between dioxin and health effects." In his opinion, due to the participation of these scientists, the SAB was unable to draw scientifically-sound conclusions. Admiral Zumwalt emphasized that the conclusions of the Agent Orange and dioxin studies benefit unspecified "interested corporations."

4.3(i)—Leveraging National Oceanographic Capabilities

January 25, 1996

Hearing Volume No. 104-69

Background

On January 25, 1996, the Subcommittee on Energy and Environment held a joint hearing with the Committee on national Security's Subcommittee on Military Research and Development (R&D) and the Committee on Resources' Subcommittee on Fisheries, Wildlife and Oceans to receive testimony from the United States Navy, federal agencies, academia and other experts on oceanographic science and technology as well as the opportunities and benefits that can be derived from refocused and accelerated research in oceanography. The focus of the hearing, entitled, "Leveraging national Oceanographic Capabilities," was on identifying potential leveraging mechanisms and partnerships to improve our understanding of the marine environment and increase fiscal efficiency through shared research for defense and civilian purposes.

Witnesses included: Dr. Robert D. Ballard, Senior Scientist at the Woods Hole Oceanographic Institution, President of the Institute for Exploration and Chairman of the Board for the JASON Foundation for Education; Dr. Bruce Alberts, President of the national Academy of Sciences and Chairman of the national Research Council (NRC); Dr. Neal Lane, Director of the national Science Foundation (NSF); Dr. D. James Baker, Under Secretary for Oceans and Atmosphere at the national Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce; Admiral Jeremy M. Boorda, U.S. Navy Chief of Naval Operations; Rear Admiral Paul G. Gaffney, II, U.S. Navy Commander of Naval Meteorology and Oceanography at Stennis Space Center, Mississippi; Mr. Robert A. Frosh, Senior Research Fellow and Adjunct Lecturer for the Center for Science and International Affairs at the John F. Kennedy School of Government at Harvard University; and Admiral James D. Watkins, USN (Ret.), President of the Consortium for Oceanographic Research and Education.

Summary of hearing

Dr. Ballard predicted that human activity in the world's oceans will greatly expand given the explosion in population and the continued development of advanced technology. He stated the Navy's position as the leader in deep submergence technology and emphasized the need for improved access for academic institutions to that technology. Dr. Ballard also stressed the need to continue maintenance of an oceanographic fleet that will allow scientists to go to sea and pursue initiatives in manned vehicle and robotic systems. He reported that the Navy research submarine, which has become more accessible to the academic community, now has a support ship with the ability to operate remotely-operated vehicle systems. For the future, Dr. Ballard emphasized the critical need to prepare young oceanographers, scientists, and engineers. According to Dr. Ballard, the JASON project is a good example of the kind of resource leveraging that can improve oceanography education.

Dr. Alberts testified on the health and future of the United States' ocean research programs. He emphasized the need for a sustained effort to understand the role of the ocean in human activities, recognizing the continually changing challenges facing society and the ocean science community. Marine issues of present concern include the ecosystems of fisheries, economic competitiveness, national security, coastal weather hazards, environmental quality, biodiversity, and global climate change. According to Dr. Alberts, increased cooperation among the Federal Government, academia, and private industry is necessary if the United States is to continue to lead the world in oceans science and technology development. In addition, he emphasized the benefit of competitive bidding and the peer review process. Dr. Alberts noted the importance of increased cooperation in the planning and use of physical resources, including ships, satellites, and submersibles, which could increase efficiency and provide better platforms for ocean science. He also emphasized increased utilization of the World Wide Web to provide localities with the data necessary for wise coastal planning decisions.

Dr. Lane testified on the challenges in conducting state-of-the-art ocean research. He emphasized the enormous pay-offs in terms of advanced scientific understanding and the potential economic benefits of oceanographic research. He is optimistic that NSF's past partnerships with agencies that support research and education in ocean science, including NOAA, the national Aeronautics and Space Administration (NASA), the Department of Energy (DOE) and the Office of Naval Research (ONR), will allow for future coordination of research and leveraging of resources that will be necessary in the face of future budgets with little or no growth. In addition, he emphasized the need to continue the United States' international cooperation with 30 countries to meet scientific program requirements and allow deployment of research vessels in all the major oceans of the world.

Dr. Baker testified on NOAA's effort to work with the national and international ocean community to increase our knowledge of the world's oceans. According to Dr. Baker, no other agency has NOAA's vast responsibility for research, measurement, monitoring, and the delivery of products and services related to the oceans. He indicated that progress has been made in the declassification of military oceanographic data that is likely to be valuable to civilian agencies and academia. Dr. Baker invited Members of Congress to meet with NOAA, government agencies, academia, and private industry to set future priorities for ocean research.

Admiral Boorda testified on the importance of ocean research to the mission of the U.S. Navy. According to Admiral Boorda, "partnerships in oceanography between the Navy, other federal agencies, academia, and industry improve not only Navy capabilities, but support many civil applications as well." He emphasized the Navy's commitment to active partnerships with the world-wide ocean community in order to ensure the United States remains at the forefront in ocean research and technology. He added that partnerships make sense because national and international civil organizations supply the overwhelming majority of the environmental data used in the Navy's daily operations, and that the Navy allows

90 percent of the data it collects to be made available for public use. Admiral Boorda stressed that it is the Navy's goal to allow as much public access to Navy data and systems as possible. In addition, he announced the Navy's commitment to start a national oceanographic facilities council, to stay in the forefront of large-scale computer capability, establish some ocean areas as natural laboratories and to re-establish Navy-funded research chairs at appropriate oceanography and academic institutions.

Rear Admiral Gaffney testified that the Navy depends upon a global effort and requires comprehensive oceanographic information to operate safely and effectively. According to Rear Admiral Gaffney, the Navy must seize partnership opportunities in ocean research as a result of the complex technical challenges it must face every day. These partnerships allow the Navy to ensure that naval oceanography will have "peripheral vision" and "address the micro-scale oceanography that affects naval expeditionary warfare." In addition, Rear Admiral Gaffney indicated that the Navy has an obligation to make its wealth of ocean knowledge available when that knowledge can benefit other national interests without compromising national security. Rear Admiral Gaffney also stated that it is in the nation's interest to encourage students of oceanography who will become a source of technical talent that the Navy and oceanography community can tap in years to come.

Mr. Frosh expressed concern that despite the cooperation among federal agencies and between those agencies and universities, the weakest part of cooperation is the link between these entities and industry. Mr. Frosh emphasized the large number of ocean-related small- and medium-sized businesses that do not have the capacity to do their own R&D and may not be aware of how they can benefit from available knowledge. He indicated that direct contact between those doing the R&D and those in communities and businesses who may benefit from the knowledge is vital. However, Mr. Frosh expressed concern about formal statutory and regulatory mechanisms that may stand in the way. He emphasized that the designation of coordinating bodies will allow and encourage more informal contact and coordination across all levels of government between those who generate oceanographic knowledge and those businesses and industries that use it.

Admiral Watkins testified on the importance of forming new partnerships within the ocean research community. He cited the national Research Council (NRC) report that stated that changes in the post-cold war period will require "new approaches to partnerships in the oceanographic scientific community." According to Admiral Watkins, partnerships are necessary because oceanography issues are generally large in scale. Moreover, ocean science requires that issues of security, ownership of resources, and the lack of communication inside and outside the ocean community be overcome. Admiral Watkins emphasized that the ocean science community should focus on forming partnerships that optimize use of data, resources and educational/communication tools; integrating a federal agency and non-federal agency partnership management plan; and organizing a Congressional taskforce to oversee effective coordination of ocean science and technology issues in order to accelerate and improve the applicability of ocean research to the na-

tional interests. He indicated that more emphasis should be placed on expeditious declassification of any Navy environmental data that may be useful to the civilian research community.

4.3(j)—National Weather Service Modernization Program Status

February 29, 1996

Hearing Volume No. 104-57

Background

On February 29, 1996, the Subcommittee on Energy and Environment held an oversight hearing entitled, "national Weather Service Modernization Program Status," on the status of the national Weather Service's (NWS) modernization program. The focus of the hearing was on the General Accounting Office (GAO) and Department of Commerce Inspector General (IG) reports that raised concern for the lack of quality assurance and the unrealistic timetable associated with the cornerstone of the NWS modernization program, the Advanced Weather Interactive Processing System (AWIPS).

Witnesses included: the Honorable Dr. D. James Baker, Administrator of the national Oceanic and Atmospheric Administration and Under Secretary for Oceans and Atmosphere at the Department of Commerce, joined by Mr. Bill Mehuron, Director of the NWS Systems Acquisition Office; Mr. Frank De George, Inspector General at the U.S. Department of Commerce; Mr. Arthur Zygielbaum, Senior Member of the Technical Staff in the Observational Systems Division of the Jet Propulsion Laboratory at the California Institute of Technology; and Mr. Jack L. Brock, Jr., Director of Information Resources Management/Resources, Community and Economic Development at the U.S. General Accounting Office, accompanied by Randy Hite, the GAO project manager.

Summary of hearing

Dr. Baker testified on the status of NWS modernization and the concerns regarding modernization technologies. According to Dr. Baker, new technologies applied during the NWS modernization will require similar modernization of the system that processes and disseminates the data. AWIPS, designed to replace the outdated Automation of Field Operations and Services (AFOS) system, integrates data for the meteorologist and disseminates products and information to users. Dr. Baker stated that the AWIPS program was restructured last year to provide the system capabilities that support improved, cost-effective weather services as the earliest possible date. He cited an independent assessment of the AWIPS program that found that development in "incremental builds" is rapidly becoming the industry standard for system development and deployment, and recommended that the AWIPS program follow this path. He announced NWS's intention to install AWIPS at several field sites this spring. Dr. Baker explained NWS's belief that there is a minimal risk associated with this aggressive deployment schedule, but he acknowledged there is a technical risk that the schedule might slip due to the overlap of certain development

steps. In addition to the accelerated schedule, Dr. Baker indicated that the AWIPS program will be able to operate under cost caps provided that funding increments are on schedule. However, Mr. Mehuron confirmed suspicions of further cost-overruns before completion of AWIPS. According to Mr. Mehuron, independent government cost estimates for the program show the program slightly above the $525 million estimated level. Mr. Hite testified that Fiscal Year 89 staffing levels in terms of full time equivalents (FTEs) numbered 5,100, rising to 5,522 in 1995. He said that the FTE numbers for the five years between 1989 and 1995 could explain the change in NWS staff numbers over time, but those figures were unavailable.

Mr. De George testified that AWIPS development has been characterized over the years by substantial cost growth, protracted schedules, management instability, and sluggish technical progress. He indicated the modernization program, including deployment of AWIPS, was originally slated to be completed in 1995 and cost $350 million. However, Mr. De George warned that the IG's office now expects that AWIPS will not be completed before the turn of the century and will cost taxpayers over $600 million. Mr. De George expressed concern over NOAA's plan to deploy the system nationwide before demonstrating that AWIPS can replace AFOS, potentially risking many millions of dollars. In addition, he emphasized that an accelerated schedule not only increases the likelihood that the hardware will be inadequate and obsolete, but it also prevents NOAA from taking advantage of better and cheaper hardware that will be available later, when the software can be assured to work adequately and AWIPS is mature enough for full deployment. Although NOAA maintains that AWIPS must be deployed quickly because of the fragile condition of AFOS, Mr. De George revealed that AFOS, if augmented by other meteorology systems, can continue to support NWS operations at least to the year 2000. According to Mr. De George, NWS should not assume further risk than necessary at this stage in the development of AWIPS and cautions against overlapping builds. In addition to the IG's concerns regarding AWIPS, Mr. De George indicated that despite recommendations for prompt field office closures, NOAA continues to require unnecessary certification and stall field office closures. He also pointed out that while NWS has prepared detailed plans for consolidation and restructuring of field offices, it has neglected to initiate plans for streamlining its headquarters and support operations, which employ more than 1,000 staff.

Mr. Zygielbaum testified that AWIPS development, while severely troubled in the past with management, contracting and personnel problems, has made significant improvements. In Mr. Zygielbaum's opinion, AWIPS will successfully field a necessary and usable system even if no changes are made in its process or organization, but he did express concern over the project's schedule and escalating cost. Dr. Zygielbaum believes AWIPS is moving in the right direction from the basis of hardware, software and the development process. According to Mr. Zygielbaum, the hardware and software has been tested and demonstrated, indicating little risk in deployment. He defended parallel build, but cautioned that the first build must be reasonably stable before components of the second

build can be integrated into the first. Although NWS, SAO, and PRC are now functioning well together, Mr. Zygielbaum warned that a project as complex as AWIPS requires a single project manager. He suggested appointing a standing independent review team to periodically assess the status of AWIPS.

Mr. Brock testified on the GAO report, which concluded that NWS has not demonstrated AWIPS will provide better forecasts, operate fewer field offices, or reduce staffing levels. Mr. Brock warned GAO is unclear whether AWIPS is a wise investment or if the NWS will deliver AWIPS as promised. He expressed concern that NWS's ability to meet its AWIPS commitments is being jeopardized by a risky development approach. According to Mr. Brock, unless NWS takes advantage of ongoing and planned AWIPS prototyping it runs the risk of wasting taxpayer money. He cautioned against overlapping builds—potentially increasing the risk of instability from one increment to the other—in AWIPS development. Mr. Brock also indicated his surprise that Dr. Baker would agree to a $525 million spending cap for AWIPS. According to Mr. Brock, the last NWS estimate was $525 million in December 1994 and since that time several things have occurred to cause that estimate to increase. In addition to the increased costs and delays in schedule, Mr. Brock explained that NWS expectations for staffing reductions from the modernization continue to shrink.

4.3(k)—The Department of Energy's Restructured Fusion Energy Sciences Program

March 7, 1996

Hearing Volume No. 104-53

Background

On March 7, 1996, the Subcommittee on Energy and Environment held an oversight hearing entitled, "The Department of Energy's Restructured Fusion Energy Sciences Program." The hearing focused on the January 27, 1996, DOE Fusion Energy Advisory Committee (FEAC) report, *A Restructured Fusion Energy Sciences Program,* and the June 1995 national Research Council report, *Plasma Science: From Fundamental Research to Technological Applications.*

Witnesses included: Dr. Robert Conn, Dean and Walter J. Zable Professor of Engineering, University of California, San Diego School of Engineering and Chair, Department of Energy (DOE) Fusion Energy Advisory Committee (FEAC); Professor William Drummond, of the Fusion Research Center at the University of Texas at Austin; Professor George Miley, Director, Fusion Studies Laboratory, University of Illinois; Dr. L. John Perkins, the Magnetic Fusion Program at Lawrence Livermore national Laboratory; Dr. Clifford Surko, Professor of Physics at the University of California at San Diego, and Co-Chair, national Research Council Panel on Opportunities in Plasma Science and Technology; Dr. Martha Krebs, Director of the Office of Energy Research at the Department of Energy (DOE); Mr. Thomas Schatz, President of Citizens Against Government Waste (CAGW); Mr. Joseph Gavin, Jr., retired Presi-

dent and Chief Operating Officer of Grumman Corporation and member of FEAC; and, Mr. James Adams, Senior Analyst for the Safe Energy Communication Council.

Summary of hearing

Dr. Conn testified on findings from the report issued by the FEAC as well as on recommendations from the President's Committee of Advisors on Science and Technology (PCAST), which produced a report in July, 1995. Accompanying Dr. Conn were: Dr. Michael Knotek, Senior Director of Science and Technology at the Pacific Northwest national Laboratory and Chair of the Strategic Planning Subcommittee of the FEAC; and Professor James Callen, of the Department of Nuclear Engineering and Physics at the University of Wisconsin at Madison and Chair of the FEAC Scientific Issues Subcommittee. Dr. Conn stated that the FEAC-proposed mission for the new fusion program is to advance plasma science, fusion science and fusion technology—the knowledge base needed for an economically and environmentally attractive fusion energy source. Consistent with this mission, FEAC recommended three key, and new, policy goals for the program: (1) the development of fusion science (specifically the science of high temperature plasma physics and related areas), basic fusion technology and fusion plasma containment innovations; (2) the advancement of plasma science in pursuit of national science and technology goals; and (3) the continued pursuit of the goal of fusion energy through international collaboration. The FEAC recommended a budget level of $275 million in FY 1997 to fully operate existing tokamaks, maintain the U.S. commitment to the International Thermonuclear Experimental Reactor (ITER) Engineering Design Activities (EDA), and increase efforts in plasma and fusion science, particularly on alternative concepts. With regard to the issue of possible U.S. participation in the construction of ITER following the completion of the EDA in 1998, Professor Callen said that, during his subcommittee's deliberations with the ITER partners, these partners encouraged U.S. participation and indicated their ability to accommodate any decrease in U.S. funding for the project. And Dr. Knotek said that FEAC recommends that there first be a rigorous review of the ITER design and that U.S. participation be based on the merits of that review.

Professor Drummond specifically focused on the FEAC's recommendation that the fusion program be redirected to have a science orientation rather than a developmental orientation. According to Professor Drummond, the U.S. fusion program has not been managed from a scientific perspective over the last 25 years. Rather, it has been carried out as a traditional developmental program in which the science was assumed to be known and large projects organized on the basis of guesses made about where the science will be in 10 to 20 years. He stated that the next four to five years will be the most productive years of the program in understanding the basics of fusion plasmas, and that progress can continue with all the facilities and theoretical groups involved in the fusion program working at the FY 1996 funding level with no annual cost increases. Professor Drummond remarked, "in terms of the science research, I think it's a sustainable level." Further, he

indicated the United States should consider the opportunity to enter into international projects involving alternatives to the ITER, especially if such alternatives are more scientifically inclined and require less financial commitments. In addition, he recommended U.S. commitment to only those international programs that are consistent with and supplement our domestic programs. He also emphasized the need for Congress to impose discipline on the fusion program to ensure it conforms to a scientific perspective.

Professor Miley testified on his views regarding the revitalization of the fusion energy program and the FEAC report. He stated that, "[t]o truly revitalize the magnetic fusion energy program, we need a vision for fusion development, a goal that will serve to inspire not only forefront research, but also inspire young scientists and engineers to come into the field." According to Professor Miley, the present reactor concepts don't lead to that goal and revitalization of the fusion program cannot take place without an appropriate vision. He explained his disagreement with the FEAC suggestions for restructuring the program and his belief that program re-engineering will require more study. In addition, in order to ensure that the fusion program will be successful and effective, according to Professor Miley, it should have some percentage of the budget dedicated to alternative concepts. Further, he stated that it is crucial to ensure a continual evaluation of new concepts in spite of budget constraints and that if the United States is to pursue innovative concepts, there must be better communication among the participants. He also suggested establishment of a virtual center to provide a "think tank" atmosphere for alternate concepts.

Dr. Perkins testified on his concerns with the FEAC recommendations. According to Dr. Perkins, a viable fraction of the fusion R&D funds should be invested in alternative fusion concepts that have the potential of leading to an attractive commercial reactor. He remarked that, "any breakthroughs leading to a fully economically viable fusion product will lie in the exploration of innovative and alternative physics, both in the advanced tokamak program and especially in new or revisited alternative ideas." According to Dr. Perkins, it is not 100-percent clear that a conventional tokamak reactor alone will lead to a fully practicable fusion power plant and that the United States should avoid putting "all its eggs into one basket" by overinvesting in the tokamak concept. He indicated his general support for the FEAC report but emphasized two points: (1) the importance of basic science focused toward a commercial reactor power plant—that is, the coupling of the physics of a proposed alternative concept with a reactor embodiment; and (2) the lack of a FEAC-recommended quantitative budget level for alternative concepts. Dr. Perkins believes the fraction of the budget currently devoted to alternative concepts is insufficient and recommends a budget share of about 25 percent. He commended the FEAC for their recommendation for uniform peer review of future investment in new ideas, including advanced tokamak ideas, and supported Dr. Conn's view that the United States should not participate in the ITER if asked to be an equal partner because it will consume all of the available fusion budget.

Dr. Surko testified on the recommendations of that NRC Panel's June 1995 report on plasma science. According to Dr. Surko, the

Panel focused the study on the critical importance of understanding basic plasma science to the underlying fusion plasma physics and the quest for useful fusion energy. In addition, the Panel recommended that increased support for the more basic aspects of plasma science be a key element in the restructuring of the fusion energy program. He expressed concern for the protection of the 5 percent of the fusion budget for basic science, as the FEAC recommended, in order that the basic programs will not be wiped out by small increases in large projects. According to Dr. Surko, the Panel found that large projects with focused technological objectives have grown while smaller, more basic activities have suffered. Accordingly, the Panel recommended a reassessment of the relative allocation of funds between large programs and the smaller-scale activities. Further, Dr. Surko expressed his belief that the basic program should emphasize small, university-scale experiments. He said that the Panel's study revealed that although many plasma applications are progressing well, the underlying fundamental science is not. In addition, he pointed to the need for better coordination of plasma science research within the Department of Energy where there are large programs for magnetic and inertial confinement fusion but no support for the fundamental aspects of the science. Dr. Surko recommended a stable, long-term commitment and protection for the small basic program to avoid the danger it will disappear with the inevitable cost growth associated with large projects.

Dr. Krebs testified on DOE's perspective on the Fusion Energy Science Program. According to Dr. Krebs, the fusion program as it stands has a strong base from which the transition can be made to a world-class fusion energy science program. She expressed her endorsement, and the DOE's acceptance, of the FEAC's proposed program mission and goals, and indicated that the reconstruction of the DOE fusion program will reflect the FEAC recommendations. First, she said, the DOE intends to start a new plasma science initiative in FY 1997 that will grow in the out-years to about $10 million and that will be coordinated with other agencies, such as NASA and NSF, who rely on the development of plasma science. Also, she said that DOE intends to support an increased emphasis on alternative concepts and to shutdown the TFTR, as recommended by the FEAC, in 1997 or 1998. Further, she stated that resources will be concentrated on increasing the fusion science knowledge base and construction of a limited number of small- to medium-scale experiments funded within an essentially flat budget. Finally, given the financial limitations, Dr. Krebs said that the DOE will not propose that the United States host the ITER facility, but will pursue international collaboration as integral to the restructured program. Dr. Krebs stated that although fusion will not be funded at past levels, the United States will not miss the opportunity to be first rate in science and remarked that "the U.S. will rely on external peer review to go forward in making the balance between plasma science, alternatives and improvements in the tokamak technology."

Mr. Schatz testified on the FY 1997 budget for the fusion energy program and the recommendations in the FEAC report. He commended the FEAC for its recommendations for increasing plasma

research and shifting the focus of the program to alternatives, and stated that, "the U.S. is clearly at a crossroads in fusion research and certainly setting priorities." He explained the importance of setting priorities for programs, and remarked, "we wish we could do everything and maybe we could with a balanced budget." According to Mr. Schatz, CAGW believes there may be a longer-term benefit and a greater benefit to the taxpayers if more funds are invested into smaller projects, and indicated such a course would enable us to see whether the investment will bear fruit in the future without risking a large long-term investment of taxpayer money. In addition, he said that CAGW believes that TFTR should be shut down to avoid further wasteful expenditures. He noted that many questions have been raised about the commercial viability of the tokamaks and that answering them could take 30 to 40 years and $30 billion. Further, Mr. Schatz explained CAGW's belief that money for ITER should be frozen and that the United States should not take the lead in that project. According to him, researchers need to know three things before a reactor is developed—the best fuel source, the best way to contain the reaction, and the best way to convert that reaction to affordable energy. In addition, he commented that if the commercial industry isn't willing or starting to look at contributing more towards harnessing fusion energy, the taxpayers should not be expected to foot the bill; instead, it may be constructive to explore a public/private cooperative effort for funding fusion projects.

Mr. Gavin testified against the recommendations of the FEAC report and endorsed the $320 million funding level that PCAST recommended for the fusion program in July 1995. Mr. Gavin defended the $320 million funding level as the only way for the United States to maintain a leadership position in fusion, and remarked that, "the $320 million represents a holding position, not a world leadership position. Any level below $300 million would be third rate." According to Mr. Gavin, the FEAC report should have recommended that the leadership of DOE make a much more aggressive bid to achieve the PCAST recommended funding of $320 million. In addition, he believes the United States should complete its commitment to the ITER EDA, but adopt a subsidiary role for participation instead of assuming the lead. He said that FEAC should have argued more strongly for a continuing use of the three major tokamak facilities. Mr. Gavin also suggested reconstructing the tax laws to provide more incentive for a company to make an investment that will yield profits 10 to 20 years in the future.

Mr. Adams testified on the Council's recommendations for a future path for the fusion program. Specifically, he pointed to the need for expanded focus on alternative concepts to the tokamaks. According to him, if the United States continues on the tokamak path mandated in last year's budget, expenditures will total somewhere between $25 and $30 billion. Mr. Adams also referred to the budget for FY 1996, of which approximately 60 percent of the fusion budget—$154 million—relates to tokamaks. He said that it is the Council's position that the current path is unacceptable and will not lead to affordable energy, and he expressed concern that utility companies have shown little interest in fusion energy. He noted two specific recommendations from the Council: (1) that the

TFTR should not operate after this fiscal year because taxpayers cannot afford to fund three tokamaks and investigate a fourth on an international basis; and (2) that the Department should spend at least 10 percent of its budget for basic plasma physics and another 10 percent for alternative fuels. Mr. Adams indicated his support for reorganizing the fusion program and making it part of the basket of future energy options. Mr. Adams also believes there is potential for public/private cost sharing for the fusion energy program to be implemented over a period of several years.

4.3(l)—U.S. Energy Outlook and Implications for Research and Development

March 14, 1996

Hearing Volume No. 104-70†

Background

On March 14, 1996, the Subcommittee on Energy and Environment held a hearing entitled, "U.S. Energy Outlook and Implications for Research and Development, " which focused on future U.S. energy supply and related R&D, including the Energy Information Agency's Annual Energy Outlook for 1996 (AEO96), accuracy of forecasts and predictions of an oil crisis, use of forecasts in public/private sector decision-making, and implications of these forecasts for the federal role in energy research, development, demonstration and commercialization activities, specifically for programs at the Department of Energy.

Witnesses included: Dr. Jay E. Hakes, Administrator, Energy Information Administration (EIA); Mr. Glenn R. Schleede, President, Energy Market & Policy Analysis, Inc.; Mr. Joseph J. Romm, Acting Deputy Assistant Secretary for Energy Efficiency and Renewable Energy, DOE; and, Mr. Michael Lynch, Research Affiliate, Center for International Studies, Massachusetts Institute of Technology.

Summary of hearing

Dr. Hakes outlined AEO96, which predicts: (1) overall lower prices and greater supply for fossil fuels, coal and electricity; (2) greater impact of new technologies on energy supply; and (3) steeper decline of nuclear power than AEO95. Although he admitted that past EIA forecasts, including AEO95, have been inaccurate, Dr. Hakes defended AEO96 by saying that EIA has a better understanding of energy markets and trends and the market impact of new technologies. He stated that the United States can meet its domestic energy needs, with the important exception of oil. AEO96 predicts a gradual increase in the price of oil from $17/barrel today to approximately $25/barrel in 2015. It also reports that at present, the United States imports almost half of its oil, and predicts that by 2015, imports will account for 56-60 percent. Because of this dependence on foreign oil, said Dr. Hakes, the United States is particularly vulnerable to price shifts. He noted that the last three

† This hearing is not yet available. It will be printed during the 105th Congress.

U.S. recessions coincided with international oil price disruptions. Further, he pointed out that AEO96 predicts that by 2015, Persian Gulf oil will provide 43 percent of the world's oil consumption (compared to 30 percent today), and its share of the global oil export market will expand from approximately 50 percent today to 74 percent. Mr. Hakes concluded that growing dependence on foreign oil and the Persian Gulf's increasing share of the market are complicated by the region's inherent instability.

Mr. Schleede testified that over the last 20 years energy markets have undergone tremendous changes that are not reflected in EIA forecasts and many DOE programs. He stated that such programs are often driven by predictions of high price trends, looming crises and shortages—"Chicken Little" tactics that have served to scare Congress into excessive spending. He recommended that the Committee be wary of such forecasts and rethink its government-based approach to energy policy, keeping two basic facts in mind: EIA's poor track record has served as the basis for bad decision-making that has, in turn, cost industry and the consumer tens of billions of dollars in inflated energy costs. Moreover, he continued, as a division of DOE and because its data serves as justification for many DOE programs, EIA's decision-making rationale cannot be separated from its need to preserve itself and DOE programs. In terms of R&D, Mr. Schleede commented that technology is often market-driven and will keep developing regardless of government intervention. And, while federal R&D has yielded benefits, we must ask whether the private sector would have developed it faster without federal intrusion. He also added that R&D budgets are inflated by superfluous spending (e.g., expensive mailings & publications, market activities, etc.)

Mr. Romm stated that AEO96 is the foundation of a great deal of decision-making at DOE and testified that the United States must work to achieve a diversified energy portfolio, including expanded development and use of alternative/renewable energy sources (solar, wind, fuel cells, etc.). He stated that Republicans and Democrats from both the public and private sector agree that the United States is in an increasingly dangerous predicament as we expand our dependence on oil from the Persian Gulf, because our economy is linked to energy supply and the region is unstable. He emphasized that DOE must take all scenarios seriously, including a worst-case oil crisis. He stated that because of relatively low energy prices, private sector R&D has been flat for the past five years, and energy R&D has dropped 35 percent; and therefore DOE must undertake long-term R&D projects neglected by the private sector. In Mr. Romm's opinion, if Congress' cuts are implemented, energy security will be threatened. He concluded that via investment in fossil efficiency and alternatives, DOE will achieve multiple goals—lessening economic vulnerability and cutting pollution, the benefits of which alone justify program costs.

Mr. Lynch agreed that, "forecasting has been very bad," predominately because of logical, yet misguided trend analysis, and serious pessimism about Persian Gulf and Alaskan production. He stated that one should never rule out any scenario, but that in the most likely scenario, increased OPEC competition will keep prices low and supply at pace with demand. Although energy R&D is impor-

tant, it is not related to whether or not we will be affected by an oil crisis. An oil crisis, he said, is "a short term political event," not related to domestic or global demand trends, and the severity of which is often determined by market structure and crisis management policies, such as the Strategic Petroleum Reserve. He suggested that energy R&D "needs to be justified on the grounds of long-term and even medium-term scientific and economic benefits."

4.3(m)—Fiscal Year (FY) 1997 Budget Request for DOE, NOAA, EPA and Safe Drinking Water R&D

March 21, 1996

Hearing Volume No. 104-76†

Background

On March 21, 1996, the Subcommittee on Energy and Environment held a hearing entitled, "Fiscal Year (FY) 1997 Budget Request for DOE, NOAA, EPA and Safe Drinking Water R&D," to receive testimony from the Department of Energy (DOE), the national Oceanic and Atmospheric Administration (NOAA), the Environmental Protection Agency (EPA) and the American Water Works Association (AWWA) on the FY 1997 requests for DOE, NOAA, EPA and the Safe Drinking Water R&D. The Administration's FY 1997 request for NOAA , EPA Office of Research and Development and DOE totals $7.6 billion, a $471 million, or 6.2 percent increase over the FY 1996 level.

Witnesses included: the Honorable Dr. D. James Baker, Administrator, NOAA, and Under Secretary for Oceans and Atmosphere, U.S. Department of Commerce; The Honorable Joseph Vivona, Chief Financial Officer of the DOE; The Honorable Dr. Robert J. Huggett, Assistant Administrator for Research and Development at the EPA; and Stephen A. Hubbs, Vice President of the Louisville Water Company, testified on behalf of the AWWA.

Summary of hearing

Dr. Baker testified that NOAA's budget request increase is primarily driven by systems' costs. He stated that the budget reflects a decrease of $25 million for FTE and administrative reductions and that by 1999 NOAA will have reduced its FTEs by more than 2,000 people. He also noted the elimination of the NOAA Corps and the downsizing of ship operations. Dr. Baker stressed that the budget is allocated according to NOAA's strategic plans and its four elements: (1) advancing short-term warnings and forecasts; (2) implementing seasonal to interannual forecasts; (3) predicting decadal to centennial change to provide accurate measurements of the changing environment; and (4) making navigation safer.

Mr. Joseph Vivona testified that DOE has maximized the use of buyouts, retraining, community development, and other activities to downsize the Department. He stated that the $3 billion difference from DOE's FY 1993 appropriation is the result of three years of management initiatives and programmatic prioritization

† This hearing is not yet available. It will be printed during the 105th Congress.

that are now delivering high returns in programmatic and operational efficiency. In May 1995, Secretary O'Leary announced a Strategic Alignment Initiative (SAI) committing the Department to achieve a $1.7 billion savings through operational efficiencies over five years. According to Mr. Vivona, the Department has reformed its procurement practices to promote competition for the management and operation of DOE facilities and sites, and to improve contractor performance, response, and accountability.

Dr. Robert J. Huggett testified that EPA has reorganized twelve research laboratories and five headquarters offices into three national research laboratories, two national research centers, and two headquarters offices. He also testified that the Office of Research and Development (ORD) headquarters' staff has been reduced to less than 150. He stated that EPA is working with its Science Advisory Board (SAB), the national Academy of Sciences, the national Research Council and the private sector to obtain recommendations and guidance. Dr. Huggett highlighted research areas of primary concern for the ORD in FY1997, including drinking water, disinfection by-products, particulate matter (PM10), and endocrine disruptors. Dr. Huggett stated that the challenge in providing safe drinking water today lies in reaching an acceptable balance among competing risks. He said a reauthorized Safe Drinking Water Act will improve EPA's ability to implement its research plan and other administrative reforms now underway. Dr. Huggett also said that H.R. 3392 from the 103d Congress would allow EPA to better align research priorities and regulatory development. The Administration continues to urge strongly that Congress to pass amendments to strengthen public health protection in the SDWA and improve the regulatory process.

Mr. Hubbs testified on EPA's draft Comprehensive Drinking Water Redirection Plan. He stated that the primary objectives of the plan are the use of sound science, risk-based standard setting, implementation partnerships, and source water protection. AWWA has recommended that the highest priority be given to the use of sound science and risk-based standard setting. Mr. Hubbs noted that it is not clear how the Drinking Water Redirection Proposal will affect EPA's overall research planning and execution. However, AWWA urges that EPA research activities be modified to reflect these new drinking water priorities. He also said that AWWA recommends that authorizations and appropriations for EPA reflect these priorities.

4.3(n)—The Department of Energy's Fiscal Year (FY) 1997 Budget Request for Energy Efficiency & Renewable Energy and Fossil Energy Programs

April 17, 1996

Hearing Volume No. 104-71†

Background

On April 17, 1996, the Subcommittee on Energy & Environment held an oversight hearing entitled, "The Department of Energy's Fiscal Year (FY) 1997 Budget Request for Energy Efficiency & Renewable Energy and Fossil Energy Programs," focusing on the DOE's FY 1997 Budget Requests for Energy Efficiency and Renewable Energy and Fossil Energy Programs. The hearing focused on levels and types of program funding, the appropriate federal role in funding of deployment and commercialization of near-term technologies, and DOE's claims of program benefits.

Witnesses were divided into two panels. Panel one, which concerned efficiency & renewable energy, included: the Honorable Christine A. Ervin, Assistant Secretary for Energy Efficiency and Renewable Energy (EERE), U.S. Department of Energy; Mr. Allen Li, Associate Director, Energy Resources and Sciences Issues, United States General Accounting Office; Mr. David Nemtzow, President, Alliance to Save Energy, Washington, DC; and, Dr. Ronald L. McMahan, President, Resource Data International, Inc., Boulder, CO.

Panel two, which concerned fossil energy, included: the Honorable Patricia Fry Godley, Assistant Secretary for Fossil Energy (FE), U.S. Department of Energy; Mr. Ralph De Gennaro, Executive Director, Taxpayers for Common Sense, Washington, DC; Mr. John M. Rackley, Vice President, McDermott/Babcock and Wilcox, Alliance Research Center, Alliance, OH; and, Mr. David G. Tees, Vice President of Energy Production, Houston Lighting & Power Company, Houston, TX.

Summary of hearing

Panel 1

Ms. Ervin stated that although the budget request for EERE is significantly higher, the overall DOE budget is 13 percent lower than the FY 1996 Conference mark. Moreover, the budget request is in the context of three clear DOE priorities: (1) environmental quality—as energy demand multiplies, so does the cost of pollution control and clean/efficient technologies prevent such pollution at a fraction of the cost of cleanups; (2) economic benefit—efficient/renewable technology is a quickly-expanding global industry—meaning increased trade and foreign investment in U.S. technology—and adopting efficient technologies cuts business operating overhead and pollution-control costs—thereby generating savings that can be reinvested or passed to employees or the consumer; and (3) national energy security—by developing alternatives to fossil fuels and stabilizing U.S. energy supply, we can insulate the economy

† This hearing is not yet available. It will be printed during the 105th Congress.

from oil price shifts. This budget, she claimed, is a balanced R&D/demonstration portfolio that not only provides for successful EERE technology, but, by 2000, is projected to radically cut energy demand and carbon emissions and save over $10 billion annually; by 2010, benefits will be even greater and oil consumption will be reduced by approximately two million barrels/day. In addition to refocusing priorities, she said, EERE is setting quantitative targets and "striving to operate more like a business, and less like a bureaucracy" by broadening stakeholder participation, encouraging partnerships and private investment, and cutting administrative costs/overhead. She also stated that often the private sector does not have immediate price incentives to conduct long-range and expensive applied R&D—" . . . that is where DOE comes in."

Mr. Li outlined GAO's study of Success Stories (SS), for which DOE selected 61 of its best, most significant examples of beneficial technologies, in response to criticism that few viable technologies have come from DOE's applied R&D programs. GAO evaluated cost-effectiveness of fifteen SS technologies that covered all major programs and accounted for most of the benefits claimed in SS, and reached two basic conclusions: (1) math errors, questionable economic analysis and unsupported links between benefits and DOE contributions call into question actual benefits in eleven of the fifteen examples; and (2) the *SS* sample of technologies is too small to be representative of DOE's overall applied R&D programs. Moreover, said Mr. Li, although some measurable benefits were demonstrated, program costs were not included, so cost-benefit analysis was impossible. He concluded that DOE's methodology does not accurately reflect net benefits and "despite benefits, and there are many, we *must* look at the entire investment portfolio and ask, 'Is our investment worth it?' and 'Would the money have been better-spent elsewhere?'"

Mr. Nemtzow made four points on energy efficiency: (1) clean energy R&D fulfills multiple national priorities—energy security, lower pollution, greater economic competitiveness, job creation—therefore, the government should promote development and deployment of that technology to society; (2) these programs are not corporate welfare, but rather are partnerships between investors; (3) energy efficiency is popular and a key part of environmental strategy—the government should promote environmental protection not through regulation, but through services such as EERE; and (4) DOE, paired with industry, has a solid record of success—e.g., the energy efficient window. He claimed that scaling back or eliminating EERE programs will endanger vital current programs and set the U.S. economy and environment back long-term.

Dr. McMahan summarized the findings of RDI's recent assessment of the domestic electricity outlook. The current electric mix, he said, is composed of coal (55 percent), nuclear (20 percent), gas (11 percent), hydro (9 percent), oil (3 percent) and renewables (2 percent). Cost, environment and technological/operational restraints, said Dr. McMahan, will determine the nature of new capacity needed to meet growing domestic electric demand (1.5 percent annually)—"non-competitive utilities will not survive," and most renewables are cost prohibitive without incentives, subsidies, or are in niche markets; no type of energy production is environ-

mentally benign; and utilities are limited by geographic location, power demands, etc. RDI predicted that, due to availability, low cost and improving environmental record, coal will garner most of the new market share. It reached three major conclusions for renewables: (1) despite significantly higher costs, renewables will probably grow to 4 percent of electricity production by 2010 at a cost of approximately $50 billion; (2) under deregulation and intense market competition, renewables will "survive only in highly specialized niches"; and (3) forced implementation of renewables, through massive subsidies or penalties, would cost approximately $200 billion for a best-case market share of 11 percent by 2010.

Panel 2

Ms. Godley stated that FE's 17 percent-lower-than-FY 1996 budget changes FE's structure and approach and reflects a commitment to fiscal responsibility through leveraging federal dollars to encourage private investment, utilizing sound science and "cutting edge" technology and restructuring management/operations. She echoed the desire to operate more like a business, and said that FE has redefined its role as a federal entity by focusing on creative problem-solving to help industry meet federal regulations, promoting long-term projects that the private sector does not have resources or short-tern incentive to undertake, and preserving national energy security through maintenance of the Strategic Petroleum Reserve and long-term resource utilization planning. She said that the current budget minimizes costs, reflects these new priorities and will yield measurable benefits.

Mr. DeGennaro stated that his organization, Taxpayers for Common Sense (TC$), is "dedicated to cutting wasteful government spending, subsidies and tax breaks . . . and balancing the budget." He said that TC$ supports elimination of energy tax breaks and funding for the Clean Coal Technology program, and the Coal and Petroleum R&D programs because they subsidize mature industry and are therefore corporate welfare. These programs, he said, have expanded beyond their original scopes and now duplicate or even compete with activity that can and should be undertaken by the private sector, or that the private sector has rejected. In a recent report, CBO pointed out that, "DOE continues to develop technologies in which the market clearly has no interest." He concluded that we must balance the budget and cannot afford to subsidize industry that does not need it.

Mr. Rackley stated that Babcock & Wilcox (B&W) is a global leader in power generation and marine construction technology, whose government partnerships have benefited both B&W and the nation. He said that DOE is in a unique position to help industry in terms of both high-risk and long-term investment and that, "relatively small magnitudes of federal funding can provide great leverage . . . to direct private sector resources toward the resolution of serious national problems." Without DOE-industry partnerships, he said, numerous existing technologies will be delayed or never developed. He was optimistic about the potential for "constructive reductions" in federal support, but added that arbitrary, across-the-board cuts would not only endanger current progress but would also place the United States at a disadvantage in the global mar-

ketplace against federally-subsidized energy industries in Japan and Europe, which would hurt our industrial energy base.

Mr. Tees testified to the value of DOE fossil energy R&D, and stated that Houston Lighting & Power Company has invested more than $100 million over the last ten years in DOE partnerships that have resulted in deployment of advanced energy conservation technologies and R&D which has enhanced innovation, efficiency and environmental technologies across the electric utility industry. He emphasized the importance of DOE in an era of deregulation—when fiscal needs shift and utility competition grows, DOE will not only provide stability, but will help enable competing companies to pool resources in long-term, expensive R&D that will yield national-scale economic, technical, efficiency and environmental benefits.

4.3(o)—The Department of Energy's Fiscal Year (FY) 1997 Budget Requests for Environment, Safety & Health, Environmental Restoration and Waste Management (Non-Defense) and Nuclear Energy

May 1, 1996

Hearing Volume No. 104-72†

Background

On May 1, 1996, the Subcommittee on Energy and Environment held an oversight hearing entitled, "The Department of Energy's Fiscal Year (FY) 1997 Budget Requests for Environment, Safety & Health, Environmental Restoration and Waste Management (Non-Defense) and Nuclear Energy." These programs are contained in DOE's Energy Supply R&D appropriations account. The FY 1997 budget request for the Office of Environment, Safety and Health—which includes Technical Assistance, Policy, national Energy Policy Act (NEPA), Radiation Effects Research Foundation (RERF) and Management and Administration—is $112.206 million, a decrease of $7.033 million, or 5.9 percent, below the FY 1996 appropriation of $119.209 million. DOE's Environmental Restoration and Waste Management (Non-Defense) FY 1997 budget request is $651.414 million—an increase of $53.523 million, or 9.0 percent, above the FY 1996 appropriation of $597.891 million. The FY 1997 budget request for Nuclear Energy is $248.054 million, a decrease of $3.546 million, or 1.4 percent, below the FY 1996 appropriation of $251.6 million.

Witnesses were divided into two panels. Panel one, which concerned environment, safety & health and environmental restoration and waste management (non-Defense), included: Mr. Peter Brush, Principal Deputy Assistant Secretary, Office of Environment, Safety & Health (EH), DOE; Rear Admiral Richard J. Guimond, Principal Deputy Assistant Secretary for Environmental Management (EM), DOE; Ms. Bernice Steinhardt, Associate Director for Energy, Resources, and Science Issues, U.S. General Accounting Office

† This hearing is not yet available. It will be printed during the 105th Congress.

(GAO); and, Mr. E. William Colglazier, Executive Officer, national Academy of Sciences (NAS) and national Research Council (NRC).

Panel two, which concerned nuclear energy, included: Dr. Terry Lash, Director, Office of Nuclear Energy, Science & Technology, DOE; Mr. Thomas R. Schatz, President, Citizens Against Government Waste; Mr. Phillip Bayne, CEO, Nuclear Energy Institute; and, Mr. Matthew Freedman, Energy Policy Analyst, Public Citizen.

Summary of hearing

Panel 1

Mr. Brush stated that the EH is *the* single DOE office of safety and health for more than 100,000 facility workers, the public, and the environment near federal energy facilities. Within the constraints of a balanced budget, he said, EH has consolidated administration and support services, leveraged resources, and focused its attention on three major areas: (1) individual oversight—site and human resource management; (2) health studies—state health programs, joint projects with the Department of HHS, radiation studies, and RERF; and (3) technical assistance—hazard control and advising/management at major-risk sites. He claimed that the FY 1997 budget request is a "bare-bones" budget, and that further cuts would jeopardize EH's ability to protect public/worker safety "at a time when the Department of Energy's operations have never been more dangerous."

Admiral Guimond explained that the mission of EM encompasses cleanup of hazardous sites, as well as secure maintenance of spent nuclear fuel at federal sites. DOE, said Admiral Guimond, is seeing results at a number of sites, such as Oak Ridge, West Valley, and Savannah River, and agreed with Mr. Brush that further cuts to the current budget would jeopardize this progress, as well as other cleanups and remediations. He stated that EM has been working with citizens' groups, unions, communities, etc., to adopt a "new way of doing business . . . which spends more on cleanup and less on studies" by increasing efficiency, progress and accountability via savings and privatization. As part of this disciplined approach, he said, EM has streamlined support services, administration and oversight. He reiterated his concerns that his office can only economize so far, and that EM is reaching the point where further cuts would endanger its programs. He justified the RERF program, noting that many radiation effects are generational and can only be studied long-term, as in Japan.

Ms. Steinhart focused her testimony on DOE's current Uranium Mill Tailings Remedial Action project (UMTRA), which began in 1978 to clean up contaminated land and groundwater at approximately 50 uranium ore processing sites and nearly 5,000 nearby properties. After 17 years, said Ms. Steinhardt, UMTRA is nearing completion—some eight years and $600 million (37 percent) over budget. Funding authority expires this year, and DOE is seeking approximately $300 million more to reach completion in 1998, at a final cost of $2.3 billion. Additional costs of at least $130-$200 million, she said, stem from a number of major factors—lack of defined remediation strategy, unsure technical assumptions, uncertainty of

states' ability to pay their 10 percent share of cleanup costs, changing EPA regulations, and management. Moreover, according to Ms. Steinhardt, long-term custodial costs associated with both disposal of tailings left in the ground (e.g., under paved roads, etc.), and care of privately-owned sites is seriously underestimated.

Mr. Colglazier outlined NRC's framework for ongoing evaluation of EM projects in two basic areas—operational structure and waste/clean-up management. He noted DOE seems "committed to improving the organization and operation of the EM program" as reflected in its implementation of some of NRC suggestions—expansion of performance-based contracts and decision-making based on consensus-building among stakeholders. But, he said, EM "still has a long way to go" and must implement further changes to achieve greater effectiveness and credibility including: establishing a formal decision-making process based on risk assessment, priority-setting and cost-benefit analysis; revamping R&D/technology utilization via external peer-review; and replacing self-regulation with external regulation to promote common-sense, safety and flexibility. In terms of waste, NRC's Board on Waste Management conducted recent reviews in the areas of Environmental Management Technologies and Buried/Tank Waste Remediation and suggested similar prioritized, competitive, defined, stakeholder-inclusive strategies. Finally, a recent NRC report stated that, " . . . environmental management activities are driven too often by the internal needs of the organizations charged with the remediation work rather than by the overall goal of environmental remediation."

Panel 2

Dr. Lash stated that his office has met or exceeded the Administration's review goals and streamlined staff/support services in order to run its nuclear facilities more safely and efficiently. The Office, said Dr. Lash, is concentrating on two goals: (1) certification by 1997 of an Advanced Light Water Reactor (ALWR); and (2) safety and economic viability at existing plants. Medical research and the space program have already benefited from nuclear power/research, he said, and if the Office achieves its goals, the United States can reap further benefits, including recoupment of ALWR costs via commercial sales, increased global nuclear safety via export of our superior technology, production and sale of critical isotopes used in health care and industry, etc. Despite criticism, said Dr. Lash, "it is in the nation's best interest to see [the ALWR] to completion." For current nuclear facilities, he said, present funding is modest, but adequate—without effective government involvement, not only will the 20 percent of total domestic electricity generated by nuclear power be at risk, but corrosion of nuclear industry, university research and spinoffs will accelerate.

Mr. Schatz noted his appreciation of DOE's efforts to downsize, but stated the Department should move on from the ALWR. The program, he said, has accomplished important technological goals, but is now at a dead end—its funding expired in FY 1996, industry has dropped out of participation because the technology lacks commercial viability (raising questions of cost recovery potential), and the only target markets are outside the United States, yet the taxpayer continues to foot the bill. He warned that, "eternal life is a

government program," and the Committee should realize that money is better spent elsewhere or not spent at all.

Mr. Bayne stressed the strategic importance of nuclear power in the face of economic and environmental consequences of fossil fuel dependence. As global energy demand multiplies in third world and Asian countries and dependence on Persian Gulf oil grows, he said, a robust energy policy promoting nuclear energy is "strategic insurance" and is essential to a sound and stable energy supply. According to Mr. Bayne, over 40 percent of new electricity demand since 1973 has been met by nuclear energy; and, considering that the nuclear industry matches every federal dollar with $1.75 of its own, the Federal Government is making a sound investment in the economy, environment and the nation's well-being. He provided an explanation for apparent low market interest—namely, that utility companies make decisions based on what is currently available and rarely publicize decisions before they are made.

Mr. Freedman agreed that the ALWR should not be reauthorized. He stated that the reactor's only market potential is export to S.E. Asia and China, a banned market. Not a single order has been placed for a new reactor since 1978, he said, and for the government to continue to subsidize mature, profitable companies' R&D/production is nothing more than corporate welfare. If reactors were market-viable, said Mr. Freedman, companies would invest in their production, but it now seems that the DOE wants the ALWR more than industry and the market. Moreover, Mr. Freedman denounced the ALWR as an "export promotion subsidy for ALWR industry participants" in violation of the Energy Policy Act.

4.3(p)—Changes in U.S. Patent Law and Their Implications for Energy and Environment Research and Development

May 2, 1996

Hearing Volume No. 104-58

Background

On May 2, 1996, the Subcommittee on Energy and Environment held a hearing entitled, "Changes in U.S. Patent Law and Their Implications for Energy and Environment Research and Development." From Article I of the U.S. Constitution, inventors have been afforded intellectual property rights and protections. Since 1861, those rights included a patent term of 17-years from date of issue. Under this system, the United States has become the world leader in fundamental patents, holding nearly half of all fundamental patents in the world. Along with the ratification of the General Agreement on Tariffs and Trade (GATT) in 1995, tertiary agreements regarding "harmonizing" patent laws were held. Although not required by GATT, the Clinton Administration entered into an agreement with Japan to harmonize our patent laws, and attached legislation to the Treaty which would change the 17-year term to 20 years from date of filing. Subsequent legislation has been introduced this Congress that requires publication of applications eighteen months after filing. This hearing focused on the implications of this new patent law legislation on American business.

Witnesses were divided into two panels. Panel one included: the Honorable Bruce Lehman, Commissioner of Patents & Trademarks, U.S. Patent and Trademark Office and Mr. Terry Bibbens, Entrepreneur in Residence, Office of Advocacy, Small Business Administration.

Panel two included: Dr. James P. Chandler, President, national Intellectual Property Law Institute, Washington, DC; Mr. Michael Kirk, Executive Director, The American Intellectual Property Law Association; Ms. Diane L. Gardner, Molecular Biosystems, Inc.; Mr. Roger L. May, Assistant General Counsel—Intellectual Property, Ford Motor Company; Mr. William D. Budinger, Chairman & CEO., Rodel, Inc., Newark, NJ, Delegate and Regional Technology Chair to the White House Conference on Small Business; and Mr. Salvatore J. Monte, President, Kenrich Petrochemicals, Inc.

Summary of hearing

Panel 1

Mr. Lehman supported the new patent system, and claimed that these reforms both maintain and better the system in the interests of inventors. Moreover, he said, PTO is completely "reengineering" its system to speed applicants through processing in "no more than twelve months," which will yield three major benefits: (1) specific to energy and environment, changes will encourage tech-transfer and quicker application in the private sector; (2) regarding the 20-year term, the new system is less bureaucratic and will have fewer delays, enabling faster capital returns so that when patents are issued within twelve months, the actual term of exclusivity is longer than under the present system; and (3) in terms of the 18-month publication requirement, inventors will be aware of the activity of other inventors, and will not waste resources duplicating technology that already exists. This system, he said, has not promoted intellectual property theft in Europe, and the United States is the only nation in the world without an 18-month publication. Overall, and with the expanding nature of the global economy, U.S. laws should be uniform with those around the world, he stated, and the new system will level the playing field for inventors and industry in terms of publication.

Mr. Bibbens testified that, "protection of the intellectual properties of small businesses via patents . . . is a fundamental cornerstone of the economic well-being of the U.S.," and under the new patent laws, small businesses are more vulnerable to foreign and large companies. At the crux of small business concerns about the new patent system, he said, are: (1) confidentiality pre-issuance; (2) term length certainty; and (3) ensuring that small businesses with fewer resources are not at a disadvantage to larger firms. He noted that small and large firms are markedly different in their approaches to intellectual property and resources and stated that small businesses are often in a David-Goliath relationship with large companies. He suggested that small business patents be exempt from early publication, in order to protect them from interference/competition from third parties. With respect to term certainty, he said that despite assurances from the PTO that patents will be issued within a 12- to 24-month period, the current patent

process regularly takes longer than two years to complete, especially for breakthrough technologies. Moreover, he continued, with earlier publication, more avenues for third-party of issuance are open so that not only does a 17-year-from-issue term afford longer protection than a 20-year-from-filing term, but more importantly it provides term certainty—of vital concern to a small company with few patents. In conclusion, Mr. Bibbens stated that the patent system the United States has had for over 200 years has yielded unparalleled innovation and success—the United States has no compelling reason to alter it. As a successful small businessman for 30 years, and now as a representative of thousands of small businesses, he believes that current changes put small business at a disadvantage and will ultimately hurt the economy.

Panel 2

Dr. Chandler stated that the new system of early publication and potentially shorter patent terms "imposes a tremendous hardship on the patentee." He questioned why the United States would trade a patent system which has fostered the greatest creativity and intellectual property success, for a lesser one—historically, patent processes in Japan and Europe take years longer than the U.S. system, with greater opportunity (especially in Japan) for infringement. With that in mind, he saw no reason to jeopardize the vast investment that both the Federal Government and the private sector make in research and development. He agreed with Mr. Bibbens that "pioneering" patents, which typically take longer to grant, would be more vulnerable to piracy because they would be in the public domain longer without patent protection. He also noted that such intellectual property often forms the basis of entire ranges of technology and even industry, and "it is a necessity to protect these patents." He concluded that, at a minimum, our patent system should assure a guaranteed period of protection—and that the new system will not.

Mr. Kirk stated that the new 20 year from filing term and 18-month publication laws will strengthen U.S. patent law and encourage energy & environment R&D and boost technology exports. Specifically, he stated the new procedures will encourage timely processing (on part of the applicant and the PTO) and therefore ultimately yield a longer patent term. He also stated that the 18-month publication remedies inequities between U.S. companies and other nations—over 45 percent of U.S. patents are issued to foreigners, and U.S. companies do not have access to this information in English until these patents are issued. In Mr. Kirk's opinion, our patent terms and procedures should be uniform with those of other countries. Further, he said, advanced publication will not threaten trade secrets or intellectual property sovereignty and will actually help small businesses avoid infringing on pending technologies via expanded access and the ability to monitor such inventions. He also noted that since the Johnson Administration, such ideas have been circulated and supported by numerous patent law and trade associations and the Bush and Clinton Administrations. Moreover, he said, the PTO held extensive public hearings from which it received overwhelming public support from hundreds of small and large businesses for the new laws.

Ms. Gardner stated that her company is representative of numerous small, new companies who are propelling the United States to world leadership in biotech and biomedical fields. She said that patent, regulatory and investment issues are the top concerns of her industry, and the recent changes to U.S. patent law particularly hurt small, start-up companies trying to acquire the essential capital necessary for operation. Ms. Gardner continued that the variable term, subject to the speed of the PTO, is particularly damaging. She said that "pioneering" technology historically takes longer to approve, and will therefore suffer shorter terms; that such technology often takes years to mature and receive regulatory approval, eroding market time; and that the value of bio- and medical technology is often greater late in the patent term—thus if terms are shortened, the patent holder reaps fewer benefits. Ms. Gardner explained a number of drawbacks to 18-month publication, including the opinion that small firms are particularly vulnerable to larger firms, and American technology in general is accessible earlier to foreign companies. Instead, she favored publication at 60 months, if patents have not yet been granted.

Mr. May stated that, as an international corporation, Ford's success is not only based on their innovation and quality, but their ability to compete with foreign companies. They, therefore, support the current changes to U.S. patent law because of their enhanced stability and predictability. Despite arguments to the contrary, in Mr. May's opinion, a 20-year term from date of application actually provides more certainty because it prevents manipulation and abuse via chain or "submarine" patents, and encourages efficiency in the application process. He asserted that early publication reduces duplication of R&D, allows scientists and inventors to "assess the state of the art," and also cuts patent litigation by curtailing innocent infringement. In addition, he said, the new laws provide for royalty compensation for infringement between the time of publication and date of issue, as well as term extensions for those whose applications are unduly delayed. Most importantly, stated Mr. May, harmonizing the U.S. patent system with the rest of the world benefits American companies, large and small, because of the increasingly global nature of the economy.

Mr. Budinger stated that, although the new patent law changes will have little immediate effect on his and most small business' R&D, they will enhance their competitiveness long term. Small businesses, he said, place particular importance on the strength of their patents, because often they are their only advantage against large and foreign competitors. Mr. Budinger asserted that patent law uniformity in the face of today's global economy is our only answer—"the last thing we want . . . is to have American patent law put American companies at a global disadvantage." He stated that the 20-year term ultimately "ensures every diligent applicant at least 17 years of term" by eliminating incentives to delay/obfuscate applications and giving the PTO reason to act quickly. Despite apparent drawbacks, he said, 18-month publication would also benefit small business by preventing companies from wasting scarce resources on pending technology. Also, he claimed that the notion of early publication exposing secrets is a myth—not only are 75 percent of U.S. patents filed by multinational and foreign companies,

but allowances can be made to accommodate application withdrawal, royalty rights, and pre-grant opposition. Finally, Mr. Budinger explained that plans to adopt changes such as these have been supported for decades, and much of the recent opposition stem from scare tactics and misinformation.

Mr. Monte, who holds dozens of revolutionary petrochemical patents around the world, directed most of his testimony to his experience dealing with Japan. He explained that Japanese patent practices and interpretation are abusive, illegal, and "tilted" to benefit Japanese industry—"patent flooding," where an application is narrowly defined and many slightly-modified patents are created by home-industries, is commonplace. He said that parts of GATT (namely the TRIPS Agreement) establish a global patent standard and deal with the United States, Europe, and Japan on an even basis. Unfortunately, he said, no mechanism exists to enforce the agreement, and thus do not protect American companies from Japan's bully tactics. Mr. Monte stated that the United States cannot afford to abdicate its leadership in high-tech industry by conforming to patent laws which handicap American companies.

4.3(q)—The Department of Energy's Fiscal Year (FY) 1997 Budget Request for the Office of Energy Research (OER)

May 8, 1996

Hearing Volume No. 104-66

Background

On May 8, 1996, the Subcommittee on Energy and Environment held a hearing entitled, "The Department of Energy's Fiscal Year (FY) 1997 Budget Request for the Office of Energy Research (OER)," to receive testimony from the Office of Energy Research (OER) and DOE laboratory directors on the Administration's FY 1997 budget request for OER.

Witnesses included: Dr. Martha Krebs, Director of the Office of Energy Research at the Department of Energy, and two panels.

The first panel consisted of directors of laboratories engaged in high energy and nuclear physics research and included: Dr. John Peoples, Jr., Director of Fermi national Accelerator Laboratory; Dr. Burton Richter, Director of the Stanford Linear Accelerator Center (SLAC); Dr. Nicholas P. Samios, Director of Brookhaven national Laboratory; and Dr. Hermann Grunder, Director of the Continuous Electron Beam Accelerator Facility (CEBAF).

The second panel, which included directors of laboratories involved in other OER programs, featured: Dr. David E. Moncton, Associate Laboratory Director of Argonne National Laboratory (ANL); Dr. Alvin W. Trivelpiece, Director of Oak Ridge National Laboratory (ORNL); Dr. Charles V. Shank, Director of Lawrence Berkeley National Laboratory (LBNL); and Dr. William J. Madia, Director of Pacific Northwest National Laboratory (PNNL).

Summary of hearing

Dr. Krebs stated that OER's FY 1997 budget request is "earmarked for maintaining U.S. leadership in performing fundamental

science, maintaining scientific facilities, and building the nation's scientific and technical strength." According to Dr. Krebs, OER's highest program priorities in FY 1997 include high energy physics, nuclear physics, the fusion program and expansion of selected programs. Following the cancellation of the Superconducting Super Collider, Dr. Krebs believes participation in the European Large Hadron Collider will be necessary for the United States to stay at the energy frontier. She explained that an agreement on U.S. commitment to the Large Hadron Collider at CERN should be reached sometime in 1996 and is expected to be in the neighborhood of $450 million over 10 years. However, according to Dr. Krebs, because there is no way to predict from where the most exciting science will arise, it is necessary to maintain domestic facilities like Fermilab and the Stanford Linear Accelerator. In addition to DOE priorities, Dr. Krebs also defended the Administration's reductions in the out-year budgets for high energy physics and nuclear physics. According to Dr. Krebs, the reductions beginning in 1998 through 2000, do not represent official policy or reflect the value of the DOE programs. Dr. Krebs also expressed support for and indicated progress on a plan to develop upgrades for those facilities involved in neutron science in order for the United States to maintain its eminence in the field. She further indicated DOE's commitment to collaboration with universities, industry, and national laboratories to multiply the effectiveness of its activities and leverage more research funds through partnerships.

Panel 1

Dr. Peoples testified that Fermilab is a program-dedicated lab and one of three DOE laboratories that operate particle accelerators for high-energy physics research. Dr. Peoples stated that Fermilab consists of a chain of three proton accelerators and the Tevatron, the highest energy accelerator in the world. However, Dr. Peoples emphasized that Fermilab does not have the option of operating only selected accelerators and requires sufficient resources to operate the three accelerators simultaneously for research. In addition, Dr. Peoples indicated the implementation of the Galvin Report's recommendations has prompted an effort to consolidate Fermilab, and has led to the expectation of future benefits with the restructure of environment safety and health. Dr. Peoples explained Fermilab's contribution may not be an immediate one but emphasized the importance of national focus on high-energy physics for the future.

Dr. Richter emphasized the long-range scientific impacts of the High Energy Physics program and highlighted the strong programs in both high-energy physics and synchrotron-radiation research at SLAC. He indicated that SLAC also has a very strong program in the development of accelerators and detectors for high energy physics and synchrotron radiation research, and has developed many techniques in these areas that are in use in labs worldwide. According to Dr. Richter, the Science Facilities Initiative (SFI) has been of considerable benefit to the synchrotron radiation program. Dr. Richter expressed concern that environment safety and health costs, including the mandated studies and reports, burden the DOE laboratories. According to Dr. Richter, easing those burdens would

allow the national laboratories to run more efficiently. Dr. Richter said that he believed that reducing DOE to a non-Cabinet level position will not harm energy research programs, but elimination of the Department would require careful placement of research programs to preserve their efficient operation.

Dr. Samios indicated Brookhaven has major user facilities in high energy and nuclear physics and basic energy sciences, and receives 80 percent of its funding from OER. Dr. Samios emphasized that small incremental funding will allow Brookhaven to maintain its "vigorous first-class, peer-reviewed scientific program." Dr. Samios highlighted the SFI's importance in allowing cost effective and increased utilization of existing energy research facilities. Dr. Samios indicated that although many overhead costs and the number of audits by DOE have been reduced, micromanagement is still high at the DOE laboratories. Dr. Samios responded to the possibility of DOE's restructure into an agency by pointing out that the national laboratories flourished under the Atomic Energy Commission, the agency that became the Department of Energy.

Dr. Grunder emphasized the unique capabilities of CEBAF, the new DOE laboratory for nuclear physics research designed to deepen understanding of the fundamental nature of nuclear matter. He commended the SFI's contribution to increasing the scientific output at CEBAF and providing leverage to R&D funding. Dr. Grunder expressed concern for the Administration's current out-year projections for OER after FY 1997 and recommended a reprioritization of U.S. nuclear physics research without sacrificing a substantial portion of the current program. According to Dr. Grunder, the Nuclear Physics community needs a funding profile that allows for responsible planning to stay at the cutting edge and produce the most important science. Dr. Grunder answered the call for a restructure or elimination of DOE by suggesting a Congressional assessment of science in its totality to decide how to better organize the research establishment.

Panel 2

Dr. Moncton testified that OER now funds 45 percent of Argonne. According to Dr. Moncton the SFI will be instrumental to providing a fully effective program for the Advanced Proton Source (APS) as it becomes an operational facility at Argonne. Dr. Moncton indicated strong support for the Initiative which has already produced benefits at Argonne including: (1) increasing the number of days the Intense Pulsed Neutron Source (IPNS) operates; (2) operating the Argonne Tandem-Linac Accelerator System (ATLAS) 24 hours a day and seven days a week; and (3) increasing equipment performance and reliability as well as additional staff to increase operations at the HVEM-Tandem User Facility. Dr. Moncton strongly encouraged the Science Committee to work with the Administration to restore the out-year budgets for OER to healthy levels.

Dr. Trivelpiece explained that the mission of Oak Ridge Laboratory is to conduct "basic and applied research and development in order to advance the nation's energy resources, environmental quality, and scientific knowledge and to contribute to educational foundations and national economic competitiveness." Dr.

Trivelpiece explained that the SFI represents an increase in operating funds of only about 10 percent, but the resulting increase in availability and future capabilities amount to many times that. Dr. Trivelpiece expressed concern for the lack of communication to taxpayers on the value of the government-sponsored research conducted by the national labs. He emphasized careful budgeting and avoidance of a roller coaster effect in funding for research. According to Dr. Trivelpiece, variable funding levels lead people to be attracted to a field that appears to be growing, having the effect of degrading the quality of scientists as the talent leaves one area of research for another. Dr. Trivelpiece said that he believed this also prevents young scientists and engineers from entering fields that lack stability and predictability.

Dr. Shank stated the national laboratories are best utilized when they respond to national questions including energy options for the future. Dr. Shank explained the mission of the Berkeley Laboratory spans the DOE spectrum from high energy physics and high performance computing to materials and biological science and energy efficiency. Dr. Shank emphasized the contribution of SFI to the Advanced Light Source (ALS) at the Lawrence Berkeley facility which saw a 78-percent increase in the scheduled user time. According to Dr. Shank, SFI has allowed the national Center for Electron Microscopy (NCEM) to establish two new positions to provide access to the facility for scientists who are not expert microscopists.

Dr. Madia testified the programs funded through the OER budget are a vital and productive part of the nation's basic research investment. Dr. Madia indicated basic research investments are applied at Pacific Northwest national Laboratory to develop innovative technologies which reduce cleanup costs of environmental disasters such as removal of nuclear waste tanks from the ground. According to Dr. Madia, the basic research investments are coupled with applications investments from DOE's Environmental Management Program, Department of Defense programs and Environmental Protection Agency programs. Dr. Madia expressed support for the SFI because it will enable DOE to increase significantly the availability of its unique user facilities to the general scientific community and its researchers at the national labs. Dr. Madia stated that scientists and engineers require stability, but expressed concern that funding levels in the out-years of the Administration's budget will destroy the innovative process in the laboratory. According to Dr. Madia, stability and certainty of funding are much more important than the absolute budget number.

4.3(r)—Environmental Regulation: A Barrier To the Use of Environmental Technology

June 20, 1996

Hearing Volume No. 104-63

Background

On June 20, 1996, the Subcommittee on Energy and Environment and the Subcommittee on Technology held a joint hearing entitled, "Environmental Regulation: A Barrier To the Use of Envi-

ronmental Technology," to receive testimony from the Environmental Protection Agency (EPA) and representatives of the environmental industry on legal and regulatory barriers to the development and use of high technology products developed to protect and improve the environment. (See also page 247.) The discussion focused on the need for federal policies or improved regulations to facilitate the use of innovative environmental technologies.

Witnesses included: Mr. David M. Gardiner, Assistant Administrator for Policy, Planning and Evaluation for the Environmental Protection Agency; Ms. Jan Power, President of Power and Associates Corp.; Mr. John Uhr, Sales and Marketing Manager for CETAC Technologies, Inc.; and Mr. Peter A. Carroll, Vice President for Government Affairs for Solar Turbines, Inc.

Summary of hearing

Mr. Gardiner testified that EPA has already initiated significant changes to reduce regulatory and policy barriers and increase incentives for technology innovation, without compromising environmental protection. Mr. Gardiner emphasized that innovative technologies benefit not only the environment, but also U.S. industry. According to Mr. Gardiner, the U.S. environmental industry accounts for annual revenues of $134 billion and demand for environmental technologies is projected to reach $300 to $500 billion annually by 2000. However, he expressed concern that the United States could be left behind in the world environmental technology market if it does not strengthen its own position by enacting reforms to promote the development of new technologies. Mr. Gardiner indicated current internal and external impediments to the domestic market, which include: (1) statutes, regulations, policies and procedures that favor the use of conventional, often less efficient or cost-effective technologies; (2) reluctance on the part of private industry and the financial community to fund the development of new technologies; (3) inability to obtain credible, independently-verified data on the performance and cost of promising new technologies; and (4) the lack of established information networks that provide users with awareness of (and easy access to) better, cleaner, safer and lower-cost technologies. Above all, Mr. Gardiner emphasized the importance of removing EPA's "prescriptive" environmental policy framework and building a successful partnership between government and industry for flexible, performance-based regulations. He explained EPA's Project XL will provide the cornerstone to streamlining the current system. Mr. Gardiner indicated support for the performance-based standards approach, like that mandated as part of the Clean Air Act, but opposition to new legislation to reach that goal. Instead, he encouraged $80 million in funding for the Environmental Technology Initiative (ETI) in FY 1997. According to Mr. Walter Kovalick, Director of Technology Innovation for the Office of Solid Waste and Emergency Response, the ETI's purpose is to provide project grants aimed at changing the infrastructure to encourage states to issue permits for use of innovative technologies.

Mr. Urh testified on the importance of stimulating the development and use of new environmental technologies for environmental measuring and monitoring. Mr. Uhr indicated that although analytical monitoring methods continue to improve, the current ap-

proval system inhibits and delays the use of new monitoring technologies. According to Mr. Uhr, the approval system currently requires compliance with highly detailed EPA methods that often specify the use of specific procedures and analytical instrumentation. He emphasized that if the prescribed methods are not followed precisely, results will not be acceptable to auditors, the company or municipality which has contracted the test, the state environmental agency or the EPA regional and national offices. Mr. Uhr suggested more reliance on a target, instead of "cookbook" style methods, to reach an environmental goal with the most effective instrumentation and techniques. Mr. Uhr stated that adopting a performance-based system will allow EPA personnel to focus on truly new technology and the scientific quality of data. In addition, he echoed the environmental technology industry's contention that performance-based methods will increase laboratory productivity, improve the quality of testing and data, speed decision making based on monitoring, and reduce overall environmental monitoring and compliance costs. Mr. Uhr further explained that performance-based methods will increase the export market for U.S. environmental products and reduce the burden on the states for reviewing data. He commended EPA's efforts to evaluate the use of performance-based monitoring methods to replace the current system, but noted there is inconsistency among the program offices, and no deadline for completing a review of the benefits of converting to a performance-based system or how that transition should be accomplished. Mr. Uhr encouraged legislation to ensure coordination and uniformity across all environmental programs and to address issues related to the administration, enforcement, education and acceptance of the new system.

Ms. Power testified in support of the establishment of a strong national policy, as well as removal of regulatory barriers, to foster innovative technologies and prevent the development of American technologies by foreign competitors. She expressed concern that neither currently pending laws, nor the statutory and regulatory reforms relating to hazardous wastes, will improve or facilitate the research, development and commercialization of innovative environmental technologies in the United States. Ms. Power highlighted reform options that will benefit the environment and encourage innovative technologies, including: (1) eliminating RCRA technical and procedural standards for site remediation; (2) opening of the voluntary cleanup market of 500,000 sites; (3) enhancing lender liability to attract new capital into the market; and (4) reforming remedy selection based on reasonably anticipated risks and actual or planned land use. In addition, she encouraged site-specific flexibility to select the best environmental technology "without any pre-determined, absolute mandate choice that does not incorporate the facts." In support of performance-based monitoring, Ms. Power cited a recent national Academy of Sciences study reporting that EPA and other federal agencies involved in analytical work need to move from an "all-or-nothing equivalency approach to a screened iterative approach." Ms. Power recommended earmarking significant portions of cleanup funds to speed the pace of cleanup and create incentives for the development of innovative environmental technologies. She also encouraged more reliance upon professional peer

review organizations to prevent an anti-competitive environment favoring only a few vendors commercializing their new technologies.

Mr. Carroll testified on behalf of the national Association of Manufacturers and addressed the multiple layers of environmental regulation and bureaucratic rigidity stifling the development of new environmental technologies. According to Mr. Carroll, the permitting process lacks certainty at the state level where companies must make a significant investment preparing and submitting a proposal for approval. He explained consulting businesses and entire law firm departments are employed to work through the complicated application process consuming capitol that could be invested in cleanup technologies. From the application process, said Mr. Carroll, a proposal goes through a lengthy review process at EPA during which many applications are returned with recommendations for alternative technologies, different equipment, or even different sizes. According to Mr. Carroll, the rigidity of the current process, as well as concepts such as the best available control technology (BACT) and lowest achievable emission rate (LAER), resist the application of new technologies and should be reviewed. He recommended a regulatory system requiring compliance with reasonable environmental standards that will allow investors to select technologies and submit applications with a better understanding of when their investment can truly go to work. Mr. Carroll pointed out that in the past environmental regulators have relied upon quick-fix cleanup devices that rapidly reduce overall emissions to comply with clean air standards, but said that these approaches can be extremely costly with little or no environmental gain. Further, he explained that although the remaining air pollution problems require use of cheaper, reliable, common sense technologies, successful quick-fix cleanup devices remain an obstacle to new technologies of potential benefit to the United States and throughout the ever-increasingly industrialized world. In addition to problems with the approval process for innovative technologies, Mr. Carroll highlighted the lack of coordination between Department of Energy (DOE) energy efficiency and conservation programs and EPA standards. He emphasized that Clean Air Act goals and requirements should be directly connected to a national energy strategy.

4.3(s)—Partnership for a New Generation of Vehicles (PNGV): Assessment of Program Goals, Activities and Priorities

July 30, 1996

Hearing Volume No. 104-75

Background

On July 30, 1996, the Subcommittee on Energy and Environment held an oversight hearing entitled, "Partnership for a New Generation of Vehicles (PNGV): Assessment of Program Goals, Activities and Priorities," to receive testimony from Federal Government, industry and academia representatives on the Partnership for a New Generation of Vehicles (PNGV) program. The focus of the hearing

was on the PNGV program's goals, Federal Government management of the program, the role of involved agencies, funding, accomplishments to date, priorities, and the level of confidence in meeting technical schedules and milestones. In addition, representatives of the national Research Council Standing Committee To Review The Research Program Of The Partnership for a New Generation of Vehicles (PNGV Standing Committee) were asked to present the results of their annual reviews of the PNGV program and evaluate the program's responsiveness to the NRC committee's recommendations.

Witnesses in the first panel included: the Honorable Lionel S. Johns, Associate Director for Technology, Office of Science and Technology Policy, The White House; Mr. Robert M. Chapman, Chairman, PNGV Government Technical Task Force, U.S. Department of Commerce; Dr. Joseph Bordogna, Assistant Director for Engineering, national Science Foundation; and Mr. Thomas J. Gross, Deputy Assistant Secretary for Transportation Technologies, Office of Energy Efficiency and Renewable Energy, Department of Energy.

The second panel consisted of: Mr. Robert F. Mull, PNGV Director of Ford Motor Company, accompanied by Mr. Peter M. Rosenfeld, PNGV Director for the Chrysler Corporation and Dr. Ronald E. York, PNGV Director for General Motors; Mr. Trever O. Jones, Chairman of the Board (retired), Libbey-Owens-Ford Co., and Chairman, PNGV Standing Committee, National Research Council; Dr. Robert L. Hirsch, President, Energy Technology Collaborative, Inc., and Member, PNGV Standing Committee, National Research Council; and Professor Daniel Sperling, Director, Institute of Transportation Studies, University of California, Davis.

Summary of hearing

Panel 1

Mr. Johns offered testimony identifying the need for, nature of, and benefits from, the PNGV program. He emphasized that efforts to improve internal combustion engine technology and enhance the performance of exhaust-related components are not sufficient to achieve fuel economy and pollution reduction that satisfy national energy and environmental goals. Mr. Johns stressed that the development and application of new technologies to improve automotive fuel efficiency and emissions will allow significant benefits to the United States by creating a healthier global environment, reducing our reliance on oil, improving the United States' balance of trade and national security, extending the life of the world's high-end petroleum resources, increasing the competitiveness of the U.S. auto industry, opening new markets across the globe and protecting high-wage jobs. According to Mr. Johns, these potential benefits prompted the convergence of the Federal Government and the U.S. automakers to develop energy-efficient and environmentally-compatible vehicles. The PNGV program, established in 1993, includes the Federal Government, the Big Three U.S, automakers, seven federal agencies (including 18 national laboratories), universities and automotive suppliers in PNGV research. Mr. Johns said that PNGV participants share the cost of PNG projects using a variety

of arrangements including direct funding of university research, funding of cost-shared research with industry, and government-industry cooperative research arrangements. He explained that the government's share of funding is larger for high-risk projects with great technical risks or distant returns, but industry contributes a larger share of funding for technologies with a clear, near-term market. Mr. Jones defended government funding for the PNGV program by highlighting the auto manufacturers' difficulty in making capitol investments that support PNGV goals, but do not correspond with consumer demands.

Mr. Chapman presented testimony on government and industry progress during the first year and a half of the PNGV program. Mr. Chapman emphasized that the PNGV program does not operate as a single project with a specific budget. Instead, he said that the program includes a variety of ongoing research projects found to support PNGV goals with funding distributed to a variety of federal agencies and laboratories, roughly one-third of which is directly granted to the auto industry. He stated that the management assignments of the involved government agencies that have contributed to the program's structure: (1) policy direction by the Office of the Vice President; overall interagency coordination by the Department of Commerce; (2) management of the definition of the overall architecture of the vehicle systems by the Department of Energy; and (3) peer review for independent confirmation of priorities and resource commitments by the national Research Council. Mr. Chapman also stated that efforts are being made to bring others into the process, stimulate ideas, and encourage other collaborative arrangements with industry, government, and academia. He indicated that selection of critical path technologies, expected to be completed by December 1997, will allow the program to identify the most promising advanced technologies for achieving the PNGV goal of three times improvement in fuel efficiency. According to Mr. Chapman, these technologies will be applied to concept vehicles expected to be developed as prototypes during the period 2002-2004.

Dr. Bordogna explained NSF's involvement and investment in the PNGV program. He stated that NSF, through its general promotion of progress in science and technology, has funded research and education programs which have led to advances in automotive technology that will be critical to how private industry will manufacture the next generation of automobiles. Dr. Bordogna indicated that NSF program directors have estimated that approximately $54 million of NSF support in FY 1995 was for projects with the potential to improve the future design, production, use, disposal and recycling of automobiles, their accessories or components. He believes research in the area of automotive technology is a natural avenue for industry and university cooperation which has become more important in the current climate of industry downsizing. According to Dr. Bordogna, PNGV fulfills a specific national need, but also achieves a more generic end for NSF in creating an industry-academe partnership, spurred by government, that encourages a movement toward a new avenue for pursuing national priorities. He explained that most of the PNGV projects involve individual university researchers or small groups of faculty along with graduate and undergraduate students, but also includes a number of small busi-

ness innovation research (SBIR) projects, as well as university-industry collaborative projects and centers.

Mr. Gross testified on DOE's role in the PNGV program. He explained that through the Offices of Energy Efficiency and Renewable Energy, Energy Research, and Defense Programs, DOE has been an important participant in PNGV and has provided the majority of federal resources. According to Mr. Gross, DOE's mission responsibilities, including reducing our reliance on imported oil, increasing the efficiency of energy consumption and reducing the pollution resulting from energy use, are essential to achieving the PNGV goal of a three-fold improvement in fuel efficiency. In addition, Mr. Gross explained that 12 DOE laboratories are among 20 federal laboratories whose resources and capabilities are essential to PNGV efforts to reach the 80-mile per gallon goal. However, Mr. Gross pointed out that recent costs associated with the worldwide energy and environment situation are not well reflected to consumers in the price of fuel. As a result, consumers put much less emphasis on fuel economy allowing the industry to continue making big profits in producing less fuel efficient automobiles, such as those of the sport utility class. In order to avoid government controls on fuel prices and efficiency standards, Mr. Gross emphasized the value of the program's efforts to improve fuel economy and reduce the demand for petroleum.

Panel 2

Mr. Mull, accompanied by Mr. Rosenfeld and Dr. York, testified on role, management approach, and relationship of the Big Three U.S. automakers and their collaborative research organization, USCAR, with the Federal Government as participants in the PNGV program. According to Mr. Mull, the USCAR believes that although the market does not presently demand high fuel efficiency vehicles, PNGV research goals are in the public's broad interest and should be developed through an industry-government partnership. He explained the government's traditional role in support of national priorities has been to undertake long-term, high-risk basic research, such as PNGV-related research, which is essential to auto manufactures who must conduct R&D more focused to meet the demands of their customers. However, Mr. Mull indicated the working relationship of the USCAR and the government has brought mixed experiences, including the continuing challenge of dealing with the complex Federal Government. He stated that although considerable progress has been made in aligning the research done in federal agencies and labs with that of auto manufacturers and their suppliers, the program must still overcome enormous technical and administrative challenges.

Mr. Jones testified on the results of the NRC's annual reviews of the PNGV program and the program's responsiveness to the recommendations. Mr. Jones reported that the PNGV program has addressed and accepted the twenty recommendations contained in the Committee's Phase II report and announced the guidelines adopted by the NRC Standing Committee. First, he indicated the Committee's acceptance of the vehicle performance goals and objectives of the program. Second, he explained that the Committee would not prematurely recommend termination of any PNGV-selected R&D

areas. Third, Mr. Jones indicated the NRC Committee has devoted limited time to goals one and two, as these goals offer significantly less risk than goal three and neither has quantitative objectives. In addition to the guidelines, Mr. Jones indicated the NRC Committee's belief that sound engineering and analysis is fundamental to the success of PNGV and mandatory to the economic application of the R&D effort and funds. However, he noted that the initiation of systems analysis at USCAR was almost a year late in getting started. He cautioned individual USCAR partners in classification of their in-house systems models as competitive technology. According to Mr. Jones, this may defeat a primary objective of the PNGV by increasing the degree of redundancy and result in a reduction of R&D leverage per dollar invested. Mr. Jones offered the Committee's view of the potential of major technologies under consideration and development by the PNGV program. He noted the rating of the Direct Injected Compression Ignition, or diesel-fueled engine, as having the highest probability of meeting the PNGV objectives.

Dr. Hirsch addressed the problems with the PNGV program management contained in the Committee's March 1996 report. He noted a recommendation contained in the first and second reports which states that industry partners in the PNGV lack a single technical director in the USCAR and are unable to use the leverage of an integrated organization in pursuit of program goals. According to Dr. Hirsch, any of the current program difficulties could all be addressed more effectively if the USCAR members of the PNGV formed an integrated working group under a single technical director to provide direction and leadership to the many federal organizations supporting PNGV, rather than being a team in name only. He explained that management problems within the PNGV program are a result of the loose confederation of projects on the government side of the program as well as individuals who are given responsibilities, but lack authority. He also indicated the Committee's concern that the government management arrangement has little or no ability to participate actively in technology down selection in 1997 or to redeploy funds from less significant projects to more promising ones. In addition, he indicated the Committee's suggestion for regular program reviews to be scheduled in the PNGV plan, which currently lacks such review either by the participants or through independent reviews.

Professor Sperling testified with concern for the current structure of the PNGV program. He expressed his belief that unless it is refocused and reorganized, the PNGV program will not enable the United States to lead in the development of economically and environmentally beneficial automotive technologies. Professor Sperling criticized the PNGV program for neglecting to target funds toward the most promising technologies and appropriate organizations. According to Professor Sperling, the 1997 technology selection requirement for the 2004 prototypes pushes the Big Three managers toward selecting modest enhancements of conventional technologies, such as the diesel engine, and away from more advanced technologies, such as riskier but potentially far more promising fuel cells. He emphasized that automakers have more incentive to develop and commercialize "incremental" technologies, regardless of government funding, due to low fuel prices, frozen

CAFE standards, and their reluctance to share information on technological breakthroughs. Also, Professor Sperling stated that directing most PNGV-related government funds to the Big Three and their suppliers is not the most effective means of generating advanced technological development and commercialization and yields little return on significant government investment. Instead, to foster a more rapid acceleration of these technologies, he recommended directing more funding toward independent research centers and technology companies developing breakthrough technologies. Professor Sperling explained that in the past, the Big Three have effectively bought into technology developed by independent technology companies and he feels that practice should be continued.

4.3(t)—Funding the Department of Energy Research and Development in a Constrained Budget Environment

August 1, 1996

Hearing Volume No.104-77†

Background

On August 1, 1996, the Subcommittee on Energy and Environment held a hearing entitled, "Funding the Department of Energy Research and Development in a Constrained Budget Environment," which concerned cost-sharing and cost-recoupment in DOE R&D projects. Under current and projected budget constraints, the use of creative methods either to fund or to defray the cost of funding DOE R&D programs will become increasingly important. Four methods used by DOE and its laboratories are non-federal cost-sharing, requiring repayment of its investment in cost-shared technology development, Cooperative Research and Development Agreements (CRADAs), and licensing agreements.

This hearing focused on the various cost-sharing measures: (1) defining their specific strengths and weaknesses and their potential for reducing DOE's budget; (2) out-year funding requirements for cost-shared agreements and CRADAs; (3) formal regulations, policies, criteria and procedures which govern such methods; (4) the status of various DOE cost-shared programs; and (5) candidates for future cost-shared/recoupment programs.

Panel one included: Mr. Henson Moore, former Deputy Secretary of Energy, President and CEO, American Forest and Paper Association; Mr. Allen Li, Associate Director for Energy, Resources, and Science Issues, Resources, Community, and Economic Development Division, U.S. General Accounting Office (GAO); Mr. Gregory H. Friedman, Deputy Inspector General (IG) for Audits, U.S. Department of Energy; Mr. Roger A. Lewis, Senior Advisor, Office of Strategic Computing and Simulation, U.S. Department of Energy.

Panel two included: Dr. Daniel Hartley, Vice President for Laboratory Development, Sandia national Laboratory; Dr. Ron Cochran, Executive Officer, Lawrence Livermore national Laboratory;

† This hearing is not yet available. It will be printed during the 105th Congress.

and Dr. Charles Gay, Director, national Renewable Energy Laboratory.

Summary of hearing

Panel 1

Mr. Moore stated his belief " . . . that the value of Federal investments in technology R&D is maximized when agencies are made to insist on strong financial partnerships with non-federal participants." He stated, however, that although considerable lip service is paid to cost-sharing and recoupment, as Deputy Secretary of Energy he met with considerable resistance from within the Department, from industry participants and from Congress when he tried to "put teeth" into cost-sharing and recoupment contracts. While foreign companies take advantage of technology readily available at our national labs, he said, U.S. companies are often wary of the government because of its bureaucracy and lack of business mentality. Further, at DOE he said that he found "a very loose, soft program department-wide," when it came to repayment. He explained that in order for government-industry partnerships to work effectively—and more importantly, for the taxpayers to see a return on their investment—DOE must act in a more businesslike fashion, and government and industry must work as partners, share in risk and reward, and operate with regular ground rules and set procedures. Mr. Moore specifically recommended involving industry early in project development, which would give them a greater stake in seeing projects through to successful completion. He noted, however, that at present laws such as the Energy Policy Act of 1992 and most DOE-industry contracts contain highly subjective provisions and broad opportunities for waivers, thereby yielding negligible, if any, return. In response to criticism, while at DOE, that recoupment would hamper participation and slow down programs, he stated that, "if [these programs are] really good, people will pay their share and will get involved in this."

Mr. Li commented on the recent GAO review of DOE's cost-sharing/recoupment policies and focused on two basic points. First, he stated that only four of DOE's many cost-shared technology projects contain repayment requirements—and all four through royalty/licensing agreements. Second, he stated that repayment offers significant advantages and that drawbacks can be mitigated. Mr. Li asserted that a serious repayment policy would allow the Federal Government to recover some of its investment in successfully-commercialized technologies. Though DOE claims that such policies create administrative burdens and disincentives to corporate involvement, Mr. Li stressed that flexible repayment, structured with business concerns in mind, would alleviate such problems. Further, he said, repayment requirements might discourage inferior programs.

Mr. Friedman stated that the Inspector General (IG) has audited many DOE cooperative programs, and he used the IG's June 1996 audit of the Clean Coal Technology Program (CCT) as a case study. According to the report, although CCT's goal is to recover 100 percent of taxpayer investment, DOE has severely limited its ability to recover these funds. He explained that the agreements lack thor-

ough economic analysis and contain numerous exemptions and waivers based on wide-ranging false assumptions. For example, he said that DOE provided a blanket exemption on all foreign sales because of a "general belief" that foreign sales would be difficult to document and would be outweighed by domestic sales. Mr. Friedman stated, however, that a 1994 report, co-sponsored by DOE, concluded not only that the overseas market was promising for clean coal technologies, but that it was expanding faster than the domestic market. The audit also found that DOE has no verification/accounting plan to keep track of domestic sales. The IG additionally found that DOE has reduced repayment rates for numerous projects to far below industry/market standards; and finally, he stated that DOE ignored a 1991 GAO report which outlined a number of suggested improvements to DOE's programs. In addition to CCT, the IG has audited various CRADAs at the national laboratories and reached similar conclusions—lack of economic analysis and a wide-spread lack of procedures to account for industry contributions, technology sales, etc. In conclusion, Mr. Friedman delineated the IG's recommendations which included a formal accounting procedures and use of economic analysis in making changes to cooperative agreements. He stated that DOE seems open to suggestion concerning the CCT audit, but defended its actions concerning CRADAs at the national labs.

Mr. Lewis talked generally about DOE's various cost-sharing programs and stated that approximately $1-1.5 billion of R&D activities are cost-shared. He stated that cost-sharing can be built institutionally into large-scale programs, or simply written as part of agreements between DOE and corporations who are using the R&D and its resultant technology. He stated that CRADAs and other cost-shared activities are successful promote technology with greater market potential and that DOE does not want to hinder this potential or industries' incentives to participate in such projects, so the Department often grants waivers and reduced payment plans to promote greater private sector participation. Mr. Lewis also explained that licensing fees are another method DOE seeks to promote cost-sharing, especially through specific technologies at the national laboratories. He stated that DOE can recoup initial R&D costs by granting commercial licenses on DOE-patented inventions and can also collect royalties later. However, he commented that under federal law, most licensing fees will go to individual inventors, and therefore will not play a significant role in cost-reduction. In general, Mr. Lewis characterized cost-recoupment as problematic. He stated that while cost-reduction may be implemented on a case-by-case or contract-by-contract basis, requiring a universal recoupment standard would pose significant costs and create barriers to government-industry collaboration.

Panel 2

Dr. Hartley prefaced his remarks by explaining that while licensing, CRADAs, and other specific cost-sharing agreements are important and "useful," the macroeconomic benefit of cooperative R&D vastly outweighs individual program savings and eventual payback. He continued, however, that this in no way diminishes the importance of government-industry partnerships, which are key

to accomplishing labs' missions and meeting the needs of the nation. Dr. Hartley suggested DOE implement flexible cost-sharing and payback plans, rather than their current practice of broad waivers, and warned against a blanket policy. He emphasized that the most important aspect of continued cooperation is providing incentives that are mutually beneficial to both labs and industry.

Dr. Cochran discussed the evolving mission of the national labs—long-term, high-risk R&D—in the context of their changing relationship with industry and shrinking federal budgets. He explained that although recent legal changes have expanded lab-industry cooperation, the labs' focus must remain on research, not extension into commercial development. Dr. Cochran expressed support of continued growth of government-industry cooperation to reduce federal program costs. Specifically, he favored licensing agreements whose profits would be funneled directly into lab R&D accounts, rather than back to the general fund or the DOE. He also suggested an expansion of cost-avoidance programs, where a lab develops technology, and industry applies it and sells the finished product back to the lab at a fraction of the development cost.

Dr. Gay explained that he had worked in both the public and private sectors, and stated that DOE has a history of funding exploratory R&D that benefits both individuals/industry and the nation as a whole. He continued that cost-sharing projects should seek to optimize the goals of each side, and when developing cooperative programs, federal and industry roles and risk should be balanced as well. Federal R&D, said Dr. Gay, is often directed to long-term/high-risk R&D, and in his opinion, the national labs and DOE as a whole should look to the market for direction of its goals. Similarly, he said, due to the complex nature of market competition, industry must have an incentive to "blaze a trail" into new technology areas. In terms of specific program development, Dr. Gay supported upfront cost-sharing, rather than royalties, licensing, etc. He stated that upfront agreements best ensure that: (1) DOE realizes full benefits (e.g., fewer chances exist for after-the-fact waivers, exemptions, payment reductions, etc.); (2) only high-quality projects are undertaken; (3) industry has a serious commitment to the project and, therefore, has the greatest incentive to develop technology quickly and see the project through to completion; and (4) a formal framework that defines the nature of the agreement is established early in project planning. He concluded that this upfront method would also yield the greatest end results because both the Department and industry have the greatest incentives to bring projects to a successful commercial end, thereby generating profits, jobs, taxes, etc. Dr. Gay also noted that DOE was currently considering such methods to find the most appropriate cost-sharing mechanisms; their report is due in October 1996.

4.4 SUBCOMMITTEE ON SPACE AND AERONAUTICS

4.4(a)—Fiscal Year 1996 NASA Authorization

February 13 and March 16, 1995

Hearing Volume No. 104-8

Background

On February 13, 1995, and March 16, 1995, the Subcommittee on Space and Aeronautics held hearings entitled, "Fiscal Year 1996 NASA Authorization," to review the budgets of the National Aeronautics and Space Administration (NASA), the Office of Commercial Space Transportation (OCST), and the Office of Space Commerce (OSC).

Summary of Hearings

February 13, 1995

Mr. Daniel S. Goldin, NASA's Administrator, testified that the Fiscal Year 1996 budget request was robust and maintained funding for NASA's priorities including the International Space Station, the Space Shuttle, aeronautics, and technology. Goldin noted that the budget estimates were not received by the agency until January 19, 1995. An agency-wide analysis that will detail specific reductions will be complete by mid May or early June, but Goldin mentioned that major cuts will likely come from infrastructure.

Mr. Frank C. Weaver, Director of OCST at the Department of Transportation (DOT), testified that DOT is currently updating regulations concerning commercial launches and the operation of commercial launch sites to encompass new space transportation systems. He noted OCST's efforts in the area of space launch infrastructure. Mr. Weaver said that OCST is working closely with the U.S. private sector; existing Department of Defense (DOD) and NASA launch sites; emerging non-federal spaceports in California, Florida, New Mexico and Alaska; and interested state governments to develop capabilities to support a variety of launch vehicle options.

Mr. Keith Calhoun-Senghor, Director of OSC at the Department of Commerce, testified regarding the exciting new opportunities that await human civilization because of the commercialization of space including global mobil communications, remote sensing, and the use of global positioning satellites.

March 16, 1995

This hearing reviewed in detail NASA program budgets with testimony from non-agency witnesses. Specifically, there were six panels of witnesses that reviewed: (1) Restructuring NASA; (2) International Space Station and Space Shuttle; (3) Reusable Launch Vehicles (RLV); (4) Aeronautics and Technology; (5) Mission To Planet Earth (MTPE); and (6) Space Science.

Panel 1: Restructuring NASA

Mr. David H. Moore, Principal Analyst for the Congressional Budget Office's Natural Resources and Commerce Division, sug-

gested that NASA could reduce its budget by narrowing its focus. He testified that a more narrowly defined mission will permit the agency to make better choices about what programs to fund and what programs to abandon when faced with the prospect of additional large cuts in the outyears of the agency's budget.

Mr. Wolfgang Demisch, of Bankers Trust, noted that NASA is an organization with a dual role. First, it is to be a cradle of innovation to serve industry and our country. Second, NASA is to be a source of inspiration for people, especially young people. Mr. Demisch stated that any restructuring that is undertaken by the agency should preserve and enhance these objectives.

Mr. Rick Tumlinson, President of the Space Frontier Foundation, discussed the Space Frontier principles that should be applied to NASA as it prepares for the future: (1) Space is a place, not a program; (2) In free enterprise democracies, opportunities are exploited by individuals or groups in the form of companies and private institutions; (3) Frontiers are not opened by governments for the people but by the people enabled by their governments; and (4) Without extremely low-cost, reliable and regular access to space, there can be no frontier development of space.

Mr. Gerald M. May, Assistant Director for the National Legislative Commission at the American Legion, believes that the specific goals and objectives of the U.S. space program should be based on adoption of a permanent national space policy which allows clear and definable progress in security, science, and education. Mr. May also noted that this policy cannot be planned accurately without predictable funding levels for outyear budgets.

Panel 2: International Space Station and Space Shuttle

Mr. Richard H. Kohrs, Director, Center for International Aerospace Cooperation, stated that he believed Shuttle safety will not be compromised under the current projected budget reductions. However, Mr. Kohrs emphasized that NASA must be slow and deliberate when making any change that may affect safety and the Shuttle program.

Mr. Norman R. Parmet, Chairman of the Aerospace Safety Advisory Panel, testified that there is room for reductions in the Shuttle program, but warned that safety should be the one constant in any changing budget scenario.

Dr. Hans Mark, Professor of Aerospace Engineering and Engineering Mechanics at the University of Texas at Austin, stated that the Space Shuttle should be run as an operational vehicle and not as a developmental enterprise. He agreed with previous witnesses that safety should be of primary consideration to the Shuttle program and argued that the operation of the Shuttle should be transferred to a single prime contractor.

Dr. Maxime A. Faget, founder of Space Industries, Inc., testified that streamlining the Shuttle program by shrinking the organizational contractors could actually help to improve safety and reduce costs at the same time.

Ms. Lori Garver, Executive Director of the National Space Society, stated that the International Space Station should not be viewed as just another step in a long-term government space activ-

ity but as the opening wedge for large scale, non-government activity in space.

Panel 3: Reusable Launch Vehicles

Mr. Robert G. Minor, President, Space Systems Division of Rockwell International, testified that affordable space access is an essential ingredient of economic prosperity in the 21st century. To address international competition in the global marketplace, the United States must actively pursue the next generation of space transportation vehicles.

Mr. Jerry Pournelle, from the Citizen Advisory Council on National Space Policy, suggested that the RLV program should think long term and focus on a plan that: (1) builds a vehicle that can be tested; (2) costs $1 billion; and (3) can be built in less than four years.

Mr. Bob Citron, President and CEO of Kistler Aerospace Corporation, maintained that a privately owned company could design and build a full-scale RLV with no government funding. He said that Kistler Aerospace is hopeful that when a full-scale, privately owned RLV is operational, that the government will not have stifled competition by making long term procurement arrangements with other launch vehicle providers involved in the X-33 program.

Panel 4: Aeronautics and Technology

Dr. Jerry Grey, Director of Aerospace and Science Policy at the American Institute of Aeronautics and Astronautics, testified regarding the need for the national wind tunnel complex. He stated that although the investment cost of the national wind tunnel complex is considerable, the cost of not developing the facility must also be kept in mind with regard to global competition. Dr. Grey suggested that private industry and government should share in the costs of the development of the complex.

Mr. Robert Spitzer, Vice President of Engineering at Boeing, advocated the continued support of NASA's research in aeronautics to provide the technologies needed to promote industry.

Dr. Scott Pace, Chair of the Policy Committee at the National Space Society, discussed barriers to the development of space including immature technologies and government policies, and maintained that the National Space Society is working to address both issues to aid in the development of space.

Mr. Charles W. Hayes, National Program Manager for Cray Research, noted that supercomputers help make the United States the world's leader in aerospace technology. He also said that the ability for the United States to continue to compete and lead in this area is dependent upon the cooperation of government and industry, particularly NASA and industry, to help develop the fundamental technologies that will maintain our position as the world leader in the future.

Panel 5: Mission to Planet Earth

Dr. James G. Anderson, Professor, Department of Earth and Planetary Sciences at Harvard University, discussed the importance of airborne observations.

Mr. Eric J. Barron, Director of the Earth Systems Science Center at Pennsylvania State University, discussed the need to study the effect of human activities and greenhouse gasses on the environment.

Mr. Jack L. Brock, Jr., Director of Information Resource Management/National Security and International Affairs at the General Accounting Office, testifying specifically on the Earth Observation System Data and Information System (EOSDIS), stated that NASA has not adequately defined the needs of the large and diverse user community. Mr. Brock added that NASA is investing heavily in near-term development instead of critically needed research and prototyping.

Dr. Edward Teller, Lawrence Livermore National Laboratory, reviewed the benefits of using small satellites within the MTPE program.

Dr. Arthur Charo, Senior Analyst, International Security and Space Program, Office of Technology Assessment, testified that a coordinated, multi-agency approach to remote sensing, especially satellite-based remote sensing, could save money while ensuring the creation of a long-term program that would monitor the earth's environmental health.

Panel 6: Space Science

Dr. Francis Everitt, Gravity Probe B Office, Hansen Experimental Physics Lab, discussed the Gravity Probe B mission and its goal of proving Einstein's general theory of relativity.

Dr. William Boynton, Chairman of the Space Science Working Group at the University of Arizona, discussed the educational opportunities that NASA provides for students around the country.

Dr. Dan Lester, Research Scientist for the Department of Astronomy and McDonald Observatory at the University of Texas at Austin, noted that the U.S. astronomy community has very carefully set priorities and that the requests for the Space Infrared Telescope Facility (SIRTF) and the Stratospheric Observatory for Infrared Astronomy (SOFIA) are the end result of that process.

Mr. David Gump, President of Luna Corporation, testified that NASA should change the discovery program rules to allow more commercially-led mission participation.

4.4(b)—The Space Shuttle Program in Transition: Keeping Safety Paramount

September 27, 1995

Hearing Volume No. 104-20

Background

On September 27, 1995, the Subcommittee on Space and Aeronautics held a hearing entitled, "The Space Shuttle Program in Transition: Keeping Safety Paramount." The Space Shuttle program was the principle development program undertaken by NASA during the 1970's. This space transportation system was intended to use, to the maximum extent possible, a reusable components systems approach in order to reduce the per pound to orbit cost. The

design which was authorized is a reusable orbiter which is propelled into low-earth orbit (LEO) by two solid rocket boosters (SRBs) augmented by the Orbiter's main engine, all of which are mounted on an expendable external fuel tank. Once aloft, the SRBs are jettisoned and recovered at sea, while the Orbiter completes its mission and returns to either an east coast or west coast recovery site. At this site, it lands much like a conventional aircraft and then is reprocessed and returned to the launch site for its next mission. The first launch of the Space Shuttle took place in April 1981.

Summary of Hearing

Dr. Littles, NASA's Director of Human Space Flight, testified that the government should change its role to that of supervisor and auditor, because of the proven success and experience of the Space Shuttle program. He indicated that the audits must be detailed, channels of communication must remain open, and the safety process must continue to evolve to ensure a successful transition. During the questioning, Dr. Littles specified the priorities for his department: (1) safety; (2) meeting the mission requirements; and (3) reducing costs.

Mr. Fragola, Vice President of Science Applications International Corporation, certified that NASA has reduced launch risk. He discussed the advantage of risk assessment studies as tools in keeping the Shuttle program safe.

Dr. Johnstone, Director of the Aerospace Safety Advisory Panel, discussed the potential problems associated with worker morale and Shuttle safety. However, he stated that the transition could be safe as long as the changeover was performed meticulously. Dr. Johnstone also noted that the program could "lightly" shed additional costs and still maintain overall program safety.

Dr. Hans Mark, from the Department of Aerospace Engineering at the University of Texas at Austin, reiterated that safety is the responsibility of all employees. He said that most accidents were the result of human error and that it was important not to overload workers. A key point of his testimony was the need of retaining experienced employees during the changeover. During questioning, Dr. Mark stated that the morale problems would be significantly reduced when NASA made final decisions on the specifics of the transition process.

Lt. Gen. Stafford, of Stafford, Burke, and Hecker, discussed the ability of the private airline industry to maintain safety standards and inspections without causing significant wear and tear on the aircraft. He concluded that, "reduced layers of management will not increase safety hazards, if done properly."

4.4(c)—The X-33 Reusable Launch Vehicle: A New Way of Doing Business?

November 1, 1995

Hearing Volume No. 104-28

Background

On November 1, 1995, the Subcommittee on Space and Aeronautics held a hearing entitled, "The X-33 Reusable Launch Vehicle: A New Way of Doing Business?" In order to develop the next generation of reusable space launch vehicles, NASA initiated the Reusable Launch Vehicle (RLV) Program in its Office of Space Access and Technology. The purpose of the program is for NASA to provide private industry with new and enabling technology under cooperative development agreements. It is intended that there be sufficient technological risk-reduction so that industry can develop the next generation of reusable space launch vehicles based on the business viability of the launch system rather than NASA sponsorship.

This program represents an entirely new approach to the acquisition of space launch services. If successful, the RLV program will "buy-down" the technological risks facing private developers of the new system, who would then be expected to privately finance full-scale development of a privately-owned, privately-operated fleet of new economical launch vehicles. In this scenario, NASA would not enter into a prime development contract for development and certification of the new launchers, but would serve as a customer of such a system.

Technologically, the NASA-sponsored phase of the RLV development must succeed at removing key obstacles to the firms' ability to lower operational costs by perhaps an order of magnitude. Development of revolutionary technologies to cut the "dry" and fully-fueled weight of the launcher such that only one propulsion stage is needed to ferry payloads into orbit is at the heart of the program. Launching with fewer stages means fewer time-consuming pre-launch costs, lower post-mission recovery costs, and reduced "turnaround" time. In addition to achieving this fundamental simplification, work has begun on system architectures and advanced avionics that are intended to operate the launchers like an airline, reducing time spent on the ground for payload integration and maintenance.

Summary of Hearing

Dr. John E. Mansfield, NASA's Associate Administrator of the Office of Space Access and Technology, testified that the United States is lagging in space technology development because the country still uses technology developed in the 1950's. He reported that overseas competition has devastated the domestic launch industry so that the United States has only 30% of the international launch market. For these reasons, Dr. Mansfield maintained that the RLV program is one of NASA's top priorities, but warned that the program is on a tight schedule and has little money for reserves in the current funding profile.

Col. Gary Payton (retired), NASA's Director of Advanced Space Transportation, indicated that the United States was in dire need of cheap space transportation and the ability to demonstrate new technology for space transportation.

Mr. Robert Minor, President, Space Systems Division of Rockwell International, believes that the RLV is the right program for the future of space transportation. He supports the X-33 program and stated that the X-33 will provide the technical data needed to build the full-size RLV. Mr. Minor discussed possible funding changes to the X-33 program including a front-loaded funding profile that includes more money in the earlier phases of development and the necessity of a second prototype and test flights.

Mr. Charles Ordahl, Vice President and General Manager, New Space and Defense Programs at McDonnell Douglas, testified about the benefits of an RLV. He indicated an RLV would open new commercial markets and introduce a new class of military launch vehicle.

Mr. Jack Gordon, President of Lockheed Martin Skunk Works discussed the obstacles to a successful RLV program. Mr. Gordon reiterated the need for "market assurance" of the RLV because of the $5 billion cost of development and he expressed the need for more government funding in the early stages of the X-33 program.

Dr. Ray Williamson, from the Space Policy Institute at George Washington University fears that the RLV program is being oversold. He indicated that the success of the program will ultimately be based on reduced costs for space transportation, not the technological feasibility of an RLV. He expressed the need for new space transportation markets and inquired as to whether savings in launch costs would be passed on to the consumer or would be eaten up by the industrial developer of the vehicle because of the large cost of RLV program development.

4.4(d)—The Space Shuttle Program in Transition: Keeping Safety Paramount, Part II

November 9, 1995

Hearing Volume No. 104-27

Background

On November 9, 1995, the Subcommittee on Space and Aeronautics held a hearing entitled, "The Space Shuttle Program in Transition: Keeping Safety Paramount, Part II."

Summary of Hearing

Dr. Wayne Littles, NASA's Associate Administrator for Space Flight, discussed the process for restructure and transition of the Space Shuttle program. Dr. Littles stressed that continued program safety was the "primary and overriding requirement" for the transition. He reiterated the priorities for the Space Shuttle Program: (1) fly safely; (2) meet the manifest; and (3) reduce costs. Dr. Littles noted that costs for the Shuttle program have been reduced by 24% since 1992, while maintaining a safe flight rate and meeting the customers' requirements. He quoted the Functional Workforce Re-

view (FWR) that concluded: first, no areas of the budget were reduced where safety was compromised, and second, more reductions could be made without compromising safety. Dr. Littles reviewed the principles for Space Shuttle reorganization as recommended in the Kraft Report: (1) achieve more focused responsibility and accountability of contractors; (2) strengthen audit/oversight of contractor work to increase safety; (3) reduce operations costs; (4) focus the government workforce on research and development; and (5) establish a framework for possible eventual privatization. United Space Alliance (a Rockwell/Lockheed Martin consortium) has been selected as the single prime contractor for the Shuttle program. Dr. Littles explained that the process of reorganization will be separated into three different phases. In phase one, United Space Alliance would take control of contracts already being operated and controlled by private sector contractors. During phase two of the reorganization, United Space Alliance will learn, and assume responsibility for projects that are currently maintained by NASA. Finally, phase three stipulates that projects currently in the "research and development" stage at NASA, will continue to remain under the jurisdiction of NASA and would be phased into a single prime contract after all research and development on these projects has been completed.

4.4(e)—Shuttle Single Prime Contract: A Review of NASA's Determination and Findings

November 30, 1995

Hearing Volume No. 104-36

Background

On November 30, 1995, the Subcommittee on Space and Aeronautics held a hearing entitled, "Shuttle Single Prime Contract: A Review of NASA's Determination and Findings." Declining NASA budgets have forced the agency into major restructuring efforts in order to continue programs while at the same time avoiding the closure of NASA centers. Accomplishing this goal will require an overall reduction in agency personnel. The agency has commissioned a series of reviews by both internal and independent teams to provide recommendations for reaching the requisite budget goals while avoiding any compromise to program safety. An internal NASA study, the Shuttle Workforce Review, recommended that 3,200 government and contractor jobs could be eliminated from the nearly 30,000 member Shuttle workforce without jeopardizing safety of flight. These cuts would be in addition to ongoing reductions, which have achieved a 35% reduction compared with the Shuttle program's 1992 baseline.

The Space Shuttle Management Independent Review Team was formed by the NASA Administrator in November 1994 and chaired by Dr. Christopher Kraft, to provide independent recommendations to supplement internal reviews. The study, now referred to as the Kraft report, sought to evaluate the current processes and procedures for conducting Space Shuttle operations at the NASA space centers and associated contractor facilities in order to provide rec-

ommendations to the Administrator to establish a more efficient operational structure.

The Kraft report made a series of recommendations on efficiency, cost savings, and improved service to customers without jeopardizing safe operation of the Shuttle.

The most significant Kraft report recommendations are: (1) relinquish the operational responsibility of the program to a prime contractor; (2) reduce NASA's involvement in daily operations of the Shuttle; and (3) minimize modifications to the Shuttle fleet to only those which would improve safety or otherwise reduce operating costs.

In following the recommendations of the Kraft report, NASA is in the process of consolidating Space Shuttle program contracts into a "single prime" contract. This "single prime" concept, which was first used by the Space Station program, is intended to collapse the fee structure (profits paid to contractors) while rewarding the single prime contractor with additional fee incentives for achieving cost reduction goals. Under a single prime contract, the firm chosen would obtain general control over the day-to-day operations of the Space Shuttle program, while ultimate authority to certify and fly the system would continue to be held by the Federal Government.

On August 21, 1995, NASA held an industry briefing to lay the groundwork for the consolidation of some 85 separate contracts under a single prime contract. Initial letters of intent, due to the agency by September 14, 1995, were submitted by Boeing, McDonnell Douglas, United Space Alliance (a Lockheed Martin and Rockwell consortium), and the Bamsi Corporation from Titusville, Florida. The consolidation will occur over the course of one to three years though there will be some contracts of shorter duration which will be exempt and others involving developmental work which will remain under the auspices of NASA managers.

On November 7, 1995, Congress was abruptly notified by the NASA Administrator that a Determination and Findings was being released which recommended termination of competition for the contract and pursuit of a sole source contract with United Space Alliance. The Administrator's primary rationale was that the time required for further competition would jeopardize the realization of program cost savings in order to remain on schedule for construction of the International Space Station.

Summary of Hearing

Daniel S. Goldin, the Administrator of NASA, testified that Congress was notified as soon as he accepted the Source Evaluation Board's (SEB) recommendation regarding the selection of the single prime contractor. Mr. Goldin explained the timeframe for the decision to name United Space Alliance (USA) as the single prime contractor: on Nov 3rd and the morning of the 6th, he met with the SEB Chairman. The meeting with the leadership of the Science Committee occurred on November 7th. He said that safety and the desire to stick to the schedule is what drove NASA's decision to choose a single prime contractor. Administrator Goldin explained that selecting USA was the only way to achieve the goals and schedules set by NASA and Congress. USA now holds 69% of the

value of the Shuttle-related prime contracts. He stated that, of the four companies expressing interest in becoming the single prime contractor, only USA has the necessary experience base and existing operational structure to minimize schedule and safety risks. Mr. Goldin noted that a delay of only two years could cost as much as $2 to $4 billion. He reiterated the need for a safe transition to a single prime contractor. An inexperienced contractor team working to unrealistic schedules could negatively impact safety. With regard to space commercialization, Mr. Goldin explained that a sole source contract will not impact the development and commercialization of space. USA would be responsible for supporting the Space Station, including: training, flight preparation, and execution of "what's needed" to operate the Space Station. USA would have no connection to research done aboard the Space Station or product development that may result from that research. In closing, Mr. Goldin commented that 84% of the Human Space Flight and related science budget will be awarded on a competitive basis in 2002.

4.4(f)—NASA Posture Hearing

March 28, 1996

Hearing Volume No. 104-51

Background

On March 28, 1996, the Subcommittee on Space and Aeronautics held its annual "NASA Posture Hearing" on the Fiscal Year 1997 budget request. The President's budget contains outyear estimates that are not in sync with what NASA's current slate of programs will actually cost in the outyears. One set is a total annual NASA budget from OMB that declines to $11.6 billion in Fiscal Year 2000. NASA took no steps to reduce any programs as a result of OMB's cuts, so its budget runout looks like the Fiscal Year 1996 budget ($13.168 billion). The President's Fiscal Year 1997 budget makes none of the hard choices that are necessary to bring the agency down to a funding level of $11.6 billion in fiscal 2000. In last year's budget resolution conference report, Congress started the downsizing process in Fiscal Year 1996 to take the agency to $12.1 billion in Fiscal Year 2000. The White House has stated its five priorities for NASA which are to be protected from budget cuts: (1) Mission to Planet Earth (MTPE); (2) Space Station; (3) High Speed Research and Advanced Subsonic Technology in the Aeronautics program; (4) High Performance Computing and Communications; and (5) the New Millennium Initiative. According to the list, space science is not considered a "protected priority" and reflects large reductions in the outyear budget.

Summary of Hearing

According to NASA's Administrator, Daniel S. Goldin, the agency asked for stable funding through Fiscal Year 1997. The Fiscal Year 1997 budget request was at the same level in the Fiscal Year 1996 VA/HUD appropriation conference report—$13.8 billion. He stated that Fiscal Year 1997 budget stability will enable NASA to continue to restructure in an orderly, well-reasoned manner; deliver a

space and aeronautics program that's relevant, balanced and stable; and protect the human dignity of employees and contractors. It appears however, that NASA is not ready to accept the outyear numbers in the proposed budget. Goldin maintains that the outyear budget is "not chiseled in stone and I'm not taking precipitous action" to carry out the cuts. A statement by OMB is included in NASA's Fiscal Year 1997 budget request, "The outyear numbers should not be considered final policy numbers. They are going to be refined further by the Administration as it reviews possible savings (in the form of spending reductions or new fees) in all agencies. Once identified, these saving will contribute to the outyear numbers for NASA." Goldin noted that since 1993, NASA has reduced its outyear budget plan by 36% (saving taxpayers nearly $40 billion) by rescoping programs, eliminating low-priority efforts, reducing support contracts, and conducting two employee buyouts.

4.4(g)—Fiscal Year 1997 NASA Authorization

April 17, 1996

Hearing Volume No. 104-56

Background

On April 17, 1996, the Subcommittee on Space and Aeronautics held a hearing entitled, "Fiscal Year 1997 NASA Authorization." The hearing consisted of six panels of witnesses with detailed testimony regarding various NASA programs including: (1) Zero Base Review; (2) Space Technology; (3) Space Science; (4) Aeronautics; (5) Human Exploration and Development of Space; (6) and Outreach and Education.

Summary of Hearing

Panel 1: Zero Base Review

Last year, in response to the President's $5 billion cut in NASA's projected budget (NASA's contribution to the Clinton tax cut), the agency initiated the Zero Base Review (ZBR) to reduce expenditures through efficient, streamlined agency management. Currently, the ZBR has only identified about $4 billion in savings, most of which will not be realized until Fiscal Year 1999 or Fiscal Year 2000. In conjunction with the ZBR, NASA is transferring many program responsibilities from headquarters to its field centers. The purpose of this panel was to discuss ZBR as an agency effort that will both affect NASA's ability to reduce costs and its ability to continue creating and using new technology in pursuit of the nation's scientific, technical, commercial, and national security interests.

Mr. Richard J. Wisniewski, NASA's Deputy Associate Administrator for the Office of Space Flight, testified that the ZBR has met the President's challenge of $4 billion in budget reductions from Fiscal Year 1997 through Fiscal Year 2000. He stated that the ZBR has been successful in fundamentally changing the way that NASA does business by: reducing infrastructure; defining NASA center "role assignments" (missions and areas of excellence); establishing

full-cost budgeting/accounting principles; transferring responsibility to field centers; and improving science programs.

Dr. Anthony W. England, of the Space Studies Board, discussed the impact of budget reductions on space science. His testimony included recommendations that: (1) Science Institute planning should be part of a larger science plan that considers how national space goals will be attained by the sum of all NASA science activities; and (2) that "program management" activities should be split between headquarters and the field centers.

Dr. W.D. Kay, Associate Professor for Political Science at Northeastern University, praised Administrator Goldin's efforts at successfully restructuring and reducing costs at NASA.

Panel 2: Space Technology

This panel dealt principally with the creation of new technology for conducting NASA's science and space missions. NASA is developing advanced technology in several areas that will help take the United States into the next century of space activity. Unfortunately, the perception sometimes exists that NASA is the only source of new and innovative space technology. Largely as a result of government investments in NASA and the Department of Defense (DOD) during the Cold War, new and innovative technologies are flowing from the National Security laboratory system and the private sector as well as NASA. Greater use can be made of these technologies in order to reduce the costs of NASA activities and in order to create new capabilities for the civil space agency.

Col. Gary Payton, USAF (retired), Director of NASA's Office of Advanced Space Transportation, testified about the agency's program to develop technologies for a Reusable Launch Vehicle (RLV) that will prove significantly less costly to operate than the Space Shuttle. Col. Payton, a former astronaut, served previously as Director of the Ballistic Missile Defense Organization's Technology Directorate, which is the source of many new DOD-related space technologies. At this hearing, Col. Payton testified that the DC-XA test vehicle had been completely rebuilt using new lightweight technologies that could possibly be used in the X-33 program. The DC-XA is expected to begin flight testing soon. He also updated Members on the status of NASA's program for new thermal protection systems that would increase vehicle flexibility and lower costs, possibly for use on both the RLV and Space Shuttle.

Maj. Gen. Lance Lord, USAF, Director of Plans for the U.S. Air Force Space Command, testified about the relationship between NASA and the USAF in developing new technology. NASA and the USAF are in the process of working out arrangements for personnel exchanges and are creating technology planning groups with members from both agencies in order that individual programs have access to expertise available in both DOD and NASA and to ensure that costly duplication is avoided. Finally, Maj. Gen. Lord noted that the USAF was leveraging several NASA programs, such as the Clark Remote Sensing Technology Demonstrator, against some USAF mission requirements.

Dr. Rick Fleeter, President of AeroAstro Inc., testified about the possibility of using microsatellites to perform more specialized space missions at a considerably lower cost than those of currently

available satellites (these satellites tend to be very large). Dr. Fleeter noted that current microsatellite technology is in a position roughly comparable to that of the computing industry in 1976, meaning that industry and government are just starting to experiment with microsatellites and that we can look forward to explosive growth of this technology over the next two decades. Dr. Fleeter suggested that NASA's current approach to satellite constellation design was not appropriate for promoting microsatellite development. Using the computer industry analogy, he suggested that NASA's efforts to make satellites cheaper were similar to industry's efforts to make mainframe computers cheaper in the late 1970s when what was really needed was the philosophical change that created the desk-top computer.

Dr. Ray Morgan is Vice President of AeroVironment, Inc., a California-based company participating in NASA's Environmental Research Aircraft and Sensor Technology (ERAST) program to build and operate a high-altitude, long-endurance, solar-powered, unmanned aerial vehicle (UAV), essentially a pilotless airplane capable of flying continuously for thousands of hours in the stratosphere. Dr. Morgan indicated that such aircraft could act as virtual satellites for different environmental monitoring and research efforts because they had certain performance and cost advantages over satellites and manned aircraft for several different missions. Their performance advantages include: (1) no requirement for space qualification of instruments; (2) changeable payloads; (3) low cost; and (4) continuous, *in situ* measurement of environmental phenomenon.

Panel 3: Space Science

The Fiscal Year 1997 NASA budget request for Space Science declines 9% from last year and reflects a total decline of 21% from Fiscal Year 1996 to Fiscal Year 2000. The purpose of this panel was to discuss the consequences of budget reductions in space science and compare big science missions with NASA's current emphasis on "cheaper, faster, better."

Dr. Anneila Sargent, Chair of NASA's Space Science Advisory Committee, maintained that NASA would have to cut missions if the requested budget decline were to actually come to fruition. In her testimony, Dr. Sargent stated, "space science in the twenty-first century seems to be in jeopardy."

Dr. John "Jeff" Hester, lead investigator on the Hubble Space Telescope (HST) for the images of the Eagle Nebula, mentioned his concern about the direction NASA is going with "faster, better, cheaper" missions. Dr. Hester noted that some space astronomy projects require large, expensive spacecraft in order to maintain mission quality. Without adequate funding for these basic research, big science missions, the United States risks losing its scientific advantage as the world's leader in space.

Dr. Louis Lanzerotti, from Lucent Technologies and formerly of the Space Studies Board, stated that the space program has become fragmented and has lost synergy. His testimony urged that a bipartisan commission be set up to review the space program in its entirety.

Dr. Holland Ford, of Johns Hopkins University, stated that the declining budget will inevitably curtail both large and small space programs.

Dr. Louis Friedman, Chief Executive Officer of The Planetary Society, stated that the budget numbers are causing serious concerns and the outyear numbers are "disastrous." He also pointed out that MTPE has a solid constituency of Senators and the Administration; whereas the constituency for space science is the general public, and they are the ones that need to be represented.

Panel 4: Aeronautics

The purpose of the Aeronautics panel was to review the focus of NASA's aeronautics research programs in the next decade. The Fiscal Year 1997 budget for Aeronautic Research and Technology is divided into five areas: (1) Research and Technology Base; (2) High Performance Computing and Communication (HPCC); (3) Numerical Aerodynamic Simulation; (4) High Speed Research (HSR) program; and (5) Advanced Subsonic Technology (AST) program. The budget figures submitted for Fiscal Year 1997 reflect little change from the Fiscal Year 1996 VA/HUD conference report (H. Rept. 104-812). The major item of interest was the extension of the termination date of the AST program from Fiscal Year 2002 to Fiscal Year 2004 and an increase of $205 million in total costs of the program. This, combined with the scheduled completion of the HSR program in Fiscal Year 2002, led to an interest in what the agency would propose as a new direction for its aeronautics research program. Under the Administration's budget request, the AST program increases from $169 million to $187 million in Fiscal Year 1997. Last year, the House authorized this program at $133 million (an $8 million increase from Fiscal Year 1995). The VA/HUD conference report restored a portion of the funding sought last year, which boosted the program to its current level ($169 million). The Committee argued that the AST program invested primarily in "applied research" which yields only incremental advances in mature technologies.

Panel 5: Human Exploration and Development of Space

Human Exploration and Development of Space is one of the strategic enterprises in NASA. The challenge it faces is the successful and timely construction of the International Space Station while undertaking significant management restructuring, including the initial steps toward substantially private operation of the U.S. Shuttle, the primary workhorse in Space Station assembly.

Mr. Wilbur Trafton, NASA's Associate Administrator for the Office of Space Flight, testified that the International Space Station was on schedule despite a recently publicized concern with the Node 1 pressurization test. The test was delayed until the analytical model could be validated by a low pressure test, which was successfully conducted. Mr. Trafton noted NASA is entering the most critical stages of Space Station development in Fiscal Year 1997, when most of the U.S. hardware elements are at the critical design and integration stage. He emphasized that performance to date has laid an excellent technical and business foundation for entering these critical phases, and expressed full confidence in

NASA's ability to meet the technical and fiscal challenges that would be confronted in Fiscal Year 1997 and Fiscal Year 1998.

Mr. Kent Black, Chief Executive Officer of the United Space Alliance (USA), testified that NASA recently novated its existing contracts with Lockheed Martin and Rockwell, transferring them, unchanged to USA. This "early start" agreement was intended to assure continuity in Shuttle operations while full Space Flight Operations Contract (SFOC) negotiations proceeded between NASA and USA. The full SFOC contract amount, which is a subject of negotiations, was not disclosed during the hearing.

VADM Robert F. Dunn (retired), representing NASA's Aerospace Safety Advisory Panel (ASAP), discussed the work of ASAP with respect to NASA's restructuring and consolidation efforts.

Panel 6: Outreach and Education

NASA interacts with the broad, non-aerospace public in several ways, including its educational programs at universities and in grades K-12, and with its technology transfer programs, which seek to shift federally-developed technologies to U.S. commercial interests. In recent years, questions have been raised about the effectiveness of both of these programs within NASA, including their ability to leverage non-NASA dollars and to maximize the return on program costs.

Mr. Jim Pagliasotti, Executive Director of the Aerospace States Association (ASA), noted that this state government-based organization had developed an educational program that successfully leveraged state dollars to increase the private funding for space education in grades K-12. He argued that NASA does not do a very effective job of partnering with state and local governments to maximize the educational benefits of NASA's spending on space education because the agency sometimes leaves these government organizations out of its planning process and disproportionately focuses on school systems which are physically near one of NASA's regional centers. He recommended that Congress and NASA consider a pilot program to out-source some of NASA's educational programs, resources, and responsibilities to state-based organizations in a manner consistent with the current practice of transferring power from Washington back to the states.

Dr. Joel Snow, Director of the Institute for Physical Research and Technology, testified about Iowa State University's (ISU) experience in managing large federal science programs and described the University's model for transferring technology from these programs to the private sector. According to information provided by Dr. Snow, ISU has been much more effective in leveraging its research budget for commercial applications than NASA, largely because ISU takes a different approach than NASA. Dr. Snow suggested that NASA consider adopting their approach.

4.4(h)—U.S. Space Launch Strategy

June 12, 1996

Hearing Volume No. 104-59

Background

On June 12, 1996, the Subcommittee on Space and Aeronautics held a hearing entitled, "U.S. Space Launch Strategy." The purposes of the hearing were to: (1) Examine the recent launch trade agreements with China, Ukraine, and Russia; (2) Examine what the U.S. launch industry requires to be competitive in the commercial launch market; and (3) Examine the role of the Office of Commercial Space Transportation with respect to the launch trade agreements and the office's role in improving the U.S. launch industry's competitive position.

Summary of Hearing

Daniel S. Goldin, NASA's Administrator, stated that it has been 25 years since the United States has developed a major new launch vehicle or rocket engine and that cost to orbit must come down to $1,000 per pound for U.S. launch vehicles to be competitive in the world market. Mr. Goldin maintained that NASA's primary space launch role is to develop and demonstrate pre-competitive next-generation technology that will enable the commercial launch industry to provide truly affordable and reliable access to space, namely through the RLV program.

Mr. Robert Davis, the Deputy Under Secretary for Space from DOD, testified that DOD has a long history of supporting space commercialization by procuring commercial launch vehicles and making its launch infrastructure (Cape Canaveral and Vandenberg AFB) available to launch commercial payloads. He discussed current DOD policies to invest funds upgrading and standardizing U.S. launch ranges and noted that the Evolved Expendable Launch Vehicle (EELV) will further support the health of the U.S. launch industry.

Mr. Frank Weaver, Associate Administrator for the Office of Commercial Space Transportation, indicated that it was clear that the launch industry was changing from a market driven by institutional scientific and national security demands, to one powered by private sector initiatives. Mr. Weaver said that his agenda for the near-term included issuing updated spaceport/launch site regulations to aid in the development of commercial space launch sites in the United States.

Mr. Don Eiss and Catherine A. Novelli, both Deputy Assistant U.S. Trade Representatives (USTR), testified that the goal of U.S. government commercial space policy is to support and enhance U.S. competitiveness in commercial space while protecting U.S. national security and foreign policy interests. They testified that U.S. goals and objectives for our bilateral space launch agreements include: (1) providing access for U.S. satellite manufacturers to launches on foreign vehicles from countries whose economies are in transition; (2) providing safeguards against unfair or disruptive practices by foreign space launch providers in those transitional economies; and

(3) ensuring that the agreements are sufficiently flexible to take account of changing market conditions such as fluctuations in demand.

Dr. Brian Dailey, a Vice President with Lockheed Martin, noted that there is growing competition among domestic and international suppliers in the launch industry. He testified that Lockheed Martin does support maintenance of an overall trade framework. However, he believes that trade agreements should focus on unreasonably low pricing and other unfair trade practices as opposed to quotas.

Mr. Stanley Ebner, Senior Vice President at McDonnell Douglas, agreed with testimony from prior witnesses noting that the USTR does not enforce pricing provisions in trade agreements effectively. He testified that the number of launches (around 50) allowed under the trade agreements with Russia, Ukraine, and China have created an unanticipated risk to McDonnell Douglas' investment in the Delta III program.

Mr. David Montanaro, Vice President for Strategic Relations at Teledesic Corp., testified that the dilemma the United States faces is how to support the development of new capability without rewarding and encouraging anticompetitive practices. He reiterated that reducing the cost to access space will fuel more space-based solutions which, in turn, will fuel more demand for launch.

Mr. Edward O'Connor, Executive Director for the Florida Spaceport Authority, discussed proposals for federal support for spaceports in the form of joint ventures, such as the transition of Cape Canaveral into an "international spaceport," and the use of USAF range support services to aid in spaceport development ventures. He was also concerned about the lack of "clear guidance" for spaceport licenses from the FAA.

Mr. Pat Ladner, Executive Director for the Alaska Aerospace Development Corp., addressed the difficulties for spaceport development because of DOT's failure to issue regulations for launch site operators and financial responsibility regulations. He maintained state governments are capable of formulating adequate environmental impact and safety studies required by the FAA for licensing.

Mr. Donald D. Smith, Executive Director for the Western Commercial Space Center, stated that in order to compete, U.S. launch providers need the Federal Government to provide a single agency to regulate the industry, fund the infrastructure, and manage space traffic control.

4.4(i)—NASA's Uncosted Carryover

July 18, 1996

Hearing Volume No. 104-60

Background

On July 18, 1996, the Subcommittee on Space and Aeronautics held a hearing entitled, "NASA's Uncosted Carryover." The hearing reviewed a General Accounting Office (GAO) study on the problem of uncosted carryover funds within NASA programs. Specifically,

GAO concentrated on four key goals: (1) determine why MTPE carried forward such a large portion of its budget in uncosted funds; (2) compare MTPE's uncosted carryover with that of other programs, such as Space Science, the Space Station, and the Space Shuttle; (3) determine how NASA plans to reduce uncosted balances; and (4) determine how uncosted carryover balances were treated in the NASA budget.

Summary of Hearing

Mr. Thomas J. Schulz, Associate Director, Defense Acquisitions Issues, National Security and International Affairs Division of GAO, testified that it was important to use information on carryover balances when considering NASA's request for new budget authority. He said that GAO will continue to review NASA's budget requests. Mr. Schulz stated that while assessing NASA's requests for new budget authority and determining what adjustments, if any, to make to that request, the focus should be on the total resources NASA has available for the next fiscal year, not just the amount requested. In closing, he noted that NASA has shown that it is paying more attention to the carryover balances. However, the agency has not yet reached the point where it fully understands individual program carryover balances and what each program's carryover threshold could or should be.

Mr. Daniel S. Goldin, NASA's Administrator, welcomed the opportunity to work with GAO to review carryover balances within NASA programs. He said that NASA was also concerned about the increase in levels of uncosted carryovers, mentioning that NASA had formed a team headed by Chief Financial Officer Arnold Holz prior to the GAO investigation. Mr. Goldin maintained that in some cases, carryover balances were necessary for various programs. For example, he said it is critical that science programs or any research and development (R&D) program have a certain level of carryover. R&D work is very dynamic and Goldin said that it was absolutely necessary that NASA have funds on hand to avoid slipping program schedules when technical issues changes arise. Mr. Goldin also argued carryover balances were necessary in certain programs because of inherent delays in the appropriations and apportionment processes. In closing, Goldin maintained that carryover funds are used in these instances to ensure funding and continuity of programs.

4.4(j)—Space Commercialization Promotion Act of 1996

July 31, 1996

Hearing Volume 104-61

Background

A commercial space roundtable was held on March 5, 1996, to review a draft of the Omnibus Space Commercialization Act of 1996 and H.R. 1953, the Space Business Incentives Act. The roundtable featured representatives from corporations whose principal business is government contracting; entrepreneurs whose firms are developing space-related goods and services without regard to federal

outlays and programs; economists; analysts; venture capitalists; and Congressional and Executive Branch leaders. The roundtable format was chosen as the best forum in which to promote a free-flowing exchange of information, ideas, suggestions and criticisms regarding the commercialization of space. The purpose was to discuss legislative ideas that could actually improve the business environment for investing in commercial space activities. After the commercial space roundtable, the Subcommittee on Space and Aeronautics held a formal hearing on the "Space Commercialization Promotion Act of 1996," that allowed Members to review the provisions of the proposed legislation.

Summary of Hearing

Mr. Lionel S. Johns, Associate Director for Technology at the Office of Science and Technology Policy, stated that a strong, stable U.S. commercial space industry is vital to the nation's future. In order to develop the commercial space industry, Mr. Johns suggested that the United States must modify the regulatory framework to accommodate the emergence of spaceports as a resource in space transportation. He said that the Administration shared the Subcommittee's desire to encourage commercial spaceports, and indeed the Administration's space transportation policy specifically encourages private sector, state, and local investments in U.S. launch systems and infrastructure.

Lt. Gen. Spence M. Armstrong (retired), NASA's Associate Director for Human Resources and Education, discussed post-employment restrictions and portability of benefits for the entity that was awarded the single prime contract for the Space Shuttle program. He also mentioned NASA's desire for buyout authority at the $50,000 level in order to avoid a reduction in force (RIF) at the agency.

Mr. Gil Klinger, Principle Assistant Under Secretary of Defense for Space at DOD, testified that DOD is committed to enabling and assisting the commercial space sector. Mr. Klinger noted that DOD has already accomplished much through streamlined acquisition procedures; decreased military specification; and increased use of commercial products and services.

Dr. Brian Dailey, Vice President, Business Development for Space & Strategic Missiles Sector at Lockheed Martin Corporation, maintained that it was important for the United States to be a leader in the field of remote sensing, therefore Lockheed Martin supports the proposed legislation because it will help facilitate many of the commercial ventures for U.S. industry.

Dr. Scott Pace, Policy Analyst for the Rand Corporation, discussed the President's policy on the Global Positioning System (GPS), released March 29, 1996, which provided the kind of policy framework and clarity that U.S. industry requires. In addition, he said that it's important to look forward to the next step, which is the creation of a supportive international framework for the use of GPS. Dr. Pace stated the it is imperative that the United States speak with a single voice that integrates both the security and economic interests that the United States has in wider international acceptance of GPS.

Mr. Mark Brender, National Radio and Television News Directors' Association and ABC News Producer, also commented on the President's policy on GPS noting specific restrictions on remote sensing for reasons of national security and threats to foreign policy. Mr. Brender said that he was concerned that the language regarding remote sensing in the President's policy and the draft of the commercial space bill was overly broad and very vague. He argued that shutter control orders based on foreign policy concerns could be considered unconstitutional and that the remote sensing industry should be protected by the First Amendment.

4.4(k)—Life on Mars?

September 12, 1996

Hearing Volume No. 104-64

Background

On August 7, 1996, NASA announced the possibility of past life on Mars due to the recent examination of a meteorite, ALH84001. This meteorite was discovered in the Allan Hills ice field of Antarctica in 1984 by a scientific research team led by the National Science Foundation (NSF). Roberta Score, a geologist at NSF, is credited for spotting the meteorite. The green meteorite contrasted starkly against the patch of blue ice where it was found. The meteorite was brought to the JSC Meteorite Processing Laboratory. Its possible Martian origin was recognized in 1993. It was then given to a team of researchers at the Johnson Space Center and Stanford University for further analysis. On September 12, 1996, the Subcommittee on Space and Aeronautics held a hearing entitled, "Life on Mars?" The hearing reviewed the evidence regarding the possibility of primitive life on Mars and future missions to explore the red planet.

Summary of Hearing

Dr. Wesley T. Huntress, NASA's Associate Administrator for Space Science, discussed NASA's systematic plan for the step-by-step robotic exploration of Mars. The first step is to map the territory in order to identify the most interesting and scientifically beneficial areas of the planet. After conducting the aerial survey, robotic scouts would conduct a landed survey to analyze various aspects of the planet's surface. The final step would involve returning samples from Mars to Earth.

Lt. Gen. Thomas P. Stafford (retired), of Stafford, Burke, and Hecker, reviewed key technologies that are necessary to successfully undertake the exploration of Mars. He said that the realization of Mars exploration is dependent upon two fundamental technologies: (1) the restoration of a heavy-lift launch capability; and (2) the redevelopment of a nuclear thermal rocket.

Dr. David S. McKay, Assistant for Exploration, Earth Science and Solar System Exploration Division at the Johnson Space Center, discussed four clues which lead to the claim that life once existed on Mars: (1) the origin of the meteorite (from Mars) and the carbonate globules within it; (2) the presence of polycyclic aromatic

hydrocarbons; (3) the presence of iron and other compounds that are typically produced by bacteria; and (4), the microscopic pictures that look like bacterialized fossils.

Dr. Richard N. Zare, Chair of the National Space Board, Department of Chemistry at Stanford University, testified that the findings from the meteorite, ALH84001, were made possible by recent technological advances in high-resolution scanning electron microscopy and laser mass spectrometry. This equipment identifies, on a minute scale, images that once were unable to be detected. Dr. Zare reiterated that researchers found a number of features in globs of carbonate within the meteorite that can be interpreted as suggesting past life.

4.5 SUBCOMMITTEE ON TECHNOLOGY

4.5(a)—GAO Report on Cholesterol Measurement Testing Standards and Accuracy

February 14, 1995

Hearing Volume No. 104-4

Background

On February 14, 1995, the Subcommittee on Technology held a hearing entitled, "GAO Report on Cholesterol Measurement Testing Standards and Accuracy." High levels of serum cholesterol are correlated with an increased risk of coronary heart disease, which is the leading cause of death among the U.S. population. In 1985, the National Institutes of Health initiated the National Cholesterol Education Program (NCEP), which promotes screening for cholesterol among the general population and the reduction of cholesterol through medical and dietary interventions. There are currently some 4-5 million Americans receiving cholesterol-lowering drugs; in addition, as much as 15% of the population is practicing some form of dietary modification. The total cost of cholesterol tests, treatments, diets, and programs may exceed $10 billion annually. Many aspects of the nation's cholesterol agenda have been controversial, due in large part to scientific uncertainties concerning the determinants of cholesterol levels and the causes and prevention of heart disease. In 1992, the Committee on Science, Space, and Technology Subcommittee on Investigations and Oversight requested the General Accounting Office to conduct a series of studies on the measurement of cholesterol, the role of cholesterol in heart disease, the cost and efficacy of cholesterol-lowering drugs and the validity of the NCEP. *Cholesterol Measurement: Test Accuracy and Factors That Influence Cholesterol Levels* is the first GAO report in response to this request and it stated that cholesterol measurement is potentially subject to significant inaccuracies.

One panel of witnesses represented both the General Accounting Office and the National Institutes of Health. Mr. Kwai-Cheung Chan, Director of Program Evaluation in Physical Systems Areas, GAO, and Dr. Claude Lenfant, Director, National Heart, Lung, and Blood Institute, NIH testified.

Summary of hearing

Mr. Kwai-Cheung Chan, GAO, stated that, "instrument measurement error and day-to-day variations from biological and behavioral factors make it highly unlikely that individuals can 'know' their cholesterol levels based on a single measurement," therefore cholesterol levels should be viewed in ranges instead of absolute fixed numbers. It is very difficult to accurately measure cholesterol, but under controlled conditions measurements are reasonably accurate.

Dr. Claude Lenfant, NIH, testified that the National Heart, Lung, and Blood Institute (NHLBI) agrees with the GAO report with regard to the need for standardization among laboratories. However, "the problem in actual laboratory performance may be overstated." Both NHLBI and GAO believe that desk-top analyzers used in doctors' offices provide unsatisfactory results in measuring cholesterol. He stated that it is important to continue to educate individuals with information about cholesterol as well as encourage improvements in cholesterol measurements.

4.5(b)—Technology Administration/National Institute of Standards and Technology

March 23, 1995

Hearing Volume No. 104-5

Background

On March 23, 1995, the Subcommittee on Technology held a hearing entitled, "Technology Administration/National Institute of Standards and Technology." This hearing was held to review the Technology Administration (TA)/ National Institute of Standards and Technology (NIST) budget request for Fiscal Year 1996. Witnesses provided specific testimony on NIST's Advanced Technology Program (ATP) and Manufacturing Extension Partnership (MEP). The ATP is designed to improve the nation's competitiveness through grants for industrial research on "generic, pre-competitive" technology. The Budget Committee's illustrative spending cuts include the elimination of ATP funding. The MEP provides technical assistance to small and medium sized firms through an extension of network centers.

The hearing was structured in three panels. Witnesses on the first panel, which discussed support for the FY 96 budget, included: Dr. Mary Good, Under Secretary of Technology and Dr. Arati Prabhakar, Director of NIST.

The second panel, which addressed industry concerns, included: Mr. Carlson, President, Perceptron, and a representative of the Auto Body Consortium; Mr. Caisse, President and CEO of Cubicon, Inc.; Mr. Gibson, President X-Ray Opticals; Ms. Conner, Vice President of Marketing and Sales, Crystallume; Ms. Blitz, Research Fellow, American Enterprise Institute; and Dr. Hudgins, Director of Regulatory Studies, Cato Institute.

The third panel consisted of: Ms. Pounds, Director of Massachusetts Manufacturing Partnership, Bay State Skills Corporation; Mr.

Reddy, President, National Coalition for Advanced Manufacturing; and Mr. Rhoades, President, Extrude Hone Corporation.

Summary of hearing

Panel 1

Dr. Mary Good testified in support of the FY96 budget request of $1.36 billion for the Technology Administration (TA). She stated that federal involvement is crucial to promote private-sector innovation, and noted that TA is the only federal entity supporting the civilian technology base. She also stressed the importance of technology in the ever increasing global marketplace and the need for all U.S. businesses to be globally competitive.

Dr. Arati Prabhakar, Director of NIST, also testified in support of the FY96 budget request. She stated the reason NIST's budget has grown so rapidly recently is to bridge the widening gap between private and public investment in technology. NIST's role, she explained, is to support investment in long-term, risky, infrastructural technologies, driven by industry, and allocated on a competitive basis.

Panel 2

Mr. Carlson, President, Perception, testified about the importance of the ATP program in being a catalyst for bringing together the research universities, the innovation of the technology companies, and the major corporations. Because of this they are now competitive with the Japanese.

Mr. Cassie, President and CEO of Cubicon, Inc., spoke about the need for ATP investments in high risk technologies, too risky for venture capitalists to fund, but crucial to stimulate economic growth and provide monumental rewards.

Mr. Gibson, President of X-Ray Opticals, testified regarding the importance of ATP in the success of his small company. He stated, because he was without a prototype, financing would not have been available without ATP.

Ms. Conner, Vice President Marketing and Sales, Crystallume (an ATP recipient), testified about the importance of government funding for the successful start-up of high-risk technologies, but she stressed that ATP should be changed to operate more like the free market.

Ms. Beltz, Research Fellow, American Enterprise Institute, questioned the need for ATP, asking if the government is uniquely qualified to promote competitiveness in high-risk technologies. She stated venture capital is surging, questioned the ability of government to predict market potential for technologies, and stressed the need for setting priorities in this time of downsizing.

Dr. Hudgins, Director of Regulatory Studies, Cato institute, testified against government funding of the ATP program and noted that the free market works well. He stated the bureaucrats are not better suited than private investors at picking winners and losers and noted the record of government directed investment is not good.

Panel 3

Ms. Pounds, Director, Massachusetts Manufacturing Partnership, Bay States Skills Corporation (an MEP affiliate), testified about the importance of the Manufacturing Extension Partnership Program. She explained the role of MEP, saying the centers provide a wide range of services to small manufacturers, including teaching them ways to manufacture products faster and cheaper, in order to receive the best return on their investment and capture foreign markets.

Mr. Reddy, President, National Coalition for Advanced Manufacturing, said in order to bring advanced manufacturing technologies to all industrial bases, efforts of the private sector and the Federal Government need to be combined. He said federal dollars are a powerful way to stimulate other investment.

Mr. Rhoades, President, Extrude Hone Corporation, testified that manufacturing accounts for 20% of U.S. GNP, and 98% of manufacturers are small companies which in the last few decades are the only manufacturing sector with job growth. Referring to his own company, he stated that with the help of MEP, Extrude Hone Corp. has doubled their percentage of profit on sales, and 83% of Pennsylvania firms involved in MEP reported sales gains since their initial involvement.

4.5(c)—FAA Research and Acquisition Management Hearing

May 16, 1995

Hearing Volume No. 104-9

Background

On May 16, 1995, the Subcommittee on Technology held a hearing entitled, "FAA Research and Acquisition Management." The oversight hearing was held to examine the Federal Aviation Administration's (FAA) research and acquisition management. Over the past decade, major FAA modernization projects, centered around the Advanced Automation System (AAS), have experienced problems with costs, schedules, and performance. Although the FAA began efforts to modernize the Air Traffic Control (ATC) in 1981, limited progress has been made despite 14 years of efforts and the expenditure of several billion dollars. Witnesses provided specific testimony on FAA's long-standing internal management and cultural impediments to improving acquisition processes. The FAA has historically been criticized for its bureaucratic, "process over substance" culture and inability to timely field technically complex systems. FAA has recently reorganized its research and acquisition organization as a result of several internal and external reviews following the problems associated with the development of the AAS.

The hearing was structured in two panels. Witnesses on the first panel were Dr. Gerald L. Dillingham, Associate Director for Transportation Issues, and Mr. Kevin Dopart, Senior Analyst, Energy, Transportation, and Infrastructure Program. The witness on the second panel was Dr. George L. Donohue, Associate Administrator for Research and Acquisition.

Summary of hearing

Panel 1

Mr. Gerald L. Dillingham, Associate Director, Transportation and Telecommunications Issues, at GAO, testified regarding the problems in FAA's research and development programs. He stated FAA has R&D funds over $800 million, without including NASA and DOD resources. He addressed FAA's problems in developing and deploying systems in the R&D area, citing many examples of projects which are excessively behind schedule and above budget. In addition, he spoke about FAA's recent reorganization of its R&D and acquisition programs. He said the change incorporates integrated products into the R&D process, but he pointed out, although the product teams are a move in the right direction, FAA has not included the end users in the process.

Mr. Kevin P. Dopart, Senior Analyst, Energy, Transportation and Infrastructure Program, of OTA, testified regarding OTA's study on *Federal Research and Technology for Aviation.* He suggested Congress may want to encourage more fundamental research within FAA's long-term safety research programs. He also spoke about the ATC system and how chronically delayed implementation of new technologies has been. He stated, "Bridging cultural gaps is essential for effective ATC development . . . FAA needs stronger and more stable leadership and an R&D that is more operationally focused."

Panel 2

Mr. George L. Donohue, Associate Administrator for Research and Acquisition, of the Federal Aviation Administration, stated FAA's RE&D activities were crucial in helping the United States develop the safest and most efficient aviation system in the world. He noted that FAA is facing a big challenge with today's rapidly changing technology, and that a new organizational structure has been put in place to help deal with the changes. He testified that FAA is transforming its acquisition process by purchasing commercial items when possible. He also said he agreed with GAO and OTA on many of their statements.

4.5(d)—Federal Technology Transfer Policies and our Federal Laboratories: Methods for Improving Incentives for Technology Transfer at Federal Laboratories

June 27, 1995

Hearing Volume No. 104-13

Background

On June 27, 1995, the Subcommittee on Technology and the Subcommittee on Basic Research held a joint hearing entitled, "Federal Technology Transfer Policies and our Federal Laboratories: Methods for Improving Incentives for Technology Transfer at Federal Laboratories," to receive testimony regarding the transfer of technology from federal laboratories. (See also page 90.) The hearing explored the effectiveness of our federal technology transfer laws

and methods in which they may be improved. Witnesses also provided comments on the circulated draft text of H.R. 2196, the "The Technology Transfer Improvement Act of 1995," proposed by Mrs. Morella.

The hearing was structured in three panels. Witnesses on the first panel gave a historical overview of federal technology transfer policies and discussed the methods of technology transfer. Panel two witnesses included representatives of the Department of Energy laboratories which have engaged in technology transfer activities. Panel three witnesses included representatives of companies which have developed new products and applications with federal laboratories.

Summary of hearing

Panel 1

Mr. Joe Allen, Director of Training, Marketing and Economic Development at the National Technology Transfer Center, commended Mrs. Morella on her legislation. He identified three key components of the legislation: (1) it is market-driven; (2) there are incentives for laboratories and scientists; and (3) intellectual property is given to companies who commercialize the technology. He stated our ultimate goal should be linking federal laboratories, universities, and state and local business assistance programs strategically with U.S. industry in locally led initiatives.

Dr. Robert Templin, President of Virginia's Center for Innovative Technology, stated that assessing the return on investment from technology transfer is difficult, but crucial. He said we must look at jobs, companies, and competitiveness to determine its value. Dr. Templin also commented on the need to get authority to the local laboratories so the labs can enter into agreements, allowing them to be more responsive to market-driven needs.

Ms. Tina McKinley, Chair of the Federal Laboratory Consortium at Oak Ridge Institute for Science and Education, testified to her support for the legislation, and indicated it will contribute to the speed and effectiveness of federal technology transfer. She explained that all technology is different and volatile. She said flexibility is necessary, laboratories have to be able to select from a range of mechanisms depending on the situation. She added, "The fact is technology transfer, like politics, is local."

Mr. John Preston, Director of the Technology Development of MIT, representing the Association of University Technology Managers stated that we must use technology transfer to remain competitive internationally. The net effect of our sluggishness to commercialize technology, he added, is that American ideas and inventions are adopted by foreign competitors rather than U.S. companies. He said we should, "even the playing field by creating industrial research competitiveness that rivals what our foreign competitors are doing." He stated that there is a critical need for new approaches to technology commercialization, and that we need to have the courage to lower the bureaucracy that stifles entrepreneurship.

Panel 2

Ambassador C. Paul Robinson, Vice President, Laboratory Development, Sandia National Laboratory, testified on the uniqueness of the nation's DOE laboratories as "multi-problem solvers" for U.S. industry, which is what industry seeks and what the labs can best deliver. Ambassador Robinson feels the process by which technology partnerships are developed should be streamlined to improve efficiency. In response to criticism that technology partnerships were giveaways to individual companies, he stated that SNL is increasingly working with a consortia of U.S. companies. Also, SNL is now involved with medium and small size firms, an area Ambassador Robinson would like to see expanded. He stated that the national labs benefit by seeking ways their long-term goals can be leveraged by industry's aims.

Mr. Ronald W. Cochran, Laboratory Executive Officer, Lawrence Livermore National Laboratory, testified that industrial partnering is vital to the future success of LLNL's programs. He stressed that continued Congressional leadership is essential to further refine the technology transfer system and keep it viable. Mr. Cochran also expressed support for Rep. Morella's bill as a way to build on past experience with industrial partnering. He also stated the labs must have many options available when seeking out technology partnerships and to listen to industry as the best way to gauge the effectiveness of partnerships.

Mr. Richard Marczewski, Manager, Technology Transfer Office, National Renewable Energy Laboratory, testified that CRADA's are only one mechanism used by NREL to transfer technology and that the labs should have a variety of mechanisms at their disposal to bring technology to the market. He further stated that NREL plans to increase their use of licensing in the future and will actively seek access to foreign markets by acquiring foreign patents. Although Mr. Marczewski feels NREL should aggressively pursue partnering opportunities, he feels the labs' core competencies should not be compromised in the process.

Dr. Peter Lyons, Director, Industrial Partnership Office, Los Alamos National Laboratory, testified that reducing the global nuclear danger is LANL's central mission and LANL must utilize the best sources of domestic science and technology to meet such a multifaceted goal. Therefore, Dr. Lyons feels alliances with industry are very important to sustain and to expand that base of domestic science and technology. He feels partnerships with industry help LANL's core competencies and agrees with the need for flexibility in finding ways to work with industry. He voiced support for provisions within Rep. Morella's bill which strengthen the CRADA mechanism. Dr. Lyons also urged for the continued funding of the Technology Transfer Initiative as, he feels, it is vital for future partnerships LANL enters.

Mr. William Martin, Vice President, Office of Technology Transfer, Oak Ridge National Laboratory, testified that Rep. Morella's bill is a "win-win" situation for government and the private sector. Mr. Martin stated that federal agencies must fulfill their missions as assigned by Congress and what should be addressed at this time is how to improve the process of technology transfer. One improvement which should be made, according to Mr. Martin, is to make

industry better aware of the applicability of government developed technology. Further, he expressed a need to get industry involved earlier in the R&D process and reduce bureaucratic barriers to technology transfer.

Panel 3

Mr. Michael Ury, Vice-President of Fusion Lighting, asserted that without the help from the DOE and Lawrence Berkeley Laboratory, successful of development of sulfur lights would be too risky to embark on and not as timely. He said the government should have a role in developing high energy lighting. Currently, he stated, only one major lamp company is U.S.-owned. He said one of the benefits from DOE's involvement in lighting has been to stimulate a higher level of investment by the lighting companies in new technology.

Mr. Tom Fortin, Vice-President and CFO of Rio Grande Medical Technologies, Inc., testified that without the technology transfer link to Sandia National Laboratory his company would not have had the opportunity to produce the noninvasive glucose monitor for diabetics. He stated that this small collaboration has shown that technology transfer from federal laboratories can make contributions toward solving real world problems.

Mr. William Elkins, Chairman of Life Enhancement Technologies, stated that government labs need to have incentives to get the job done. Labs need to recognize who they serve, he argued, and increasing incentives for labs is essential.

4.5(e)—Maintaining Our International Competitiveness: The Importance of Standards and Conformity Assessment on Industry

June 29, 1995

Hearing Volume No. 104-12

Background

On June 29, 1995, the Subcommittee on Technology held a hearing entitled, "Maintaining Our International Competitiveness: The Importance of Standards and Conformity Assessment on Industry," to receive testimony regarding the importance of standards and conformity assessment on industry. The United States has a very decentralized standards system, not controlled by any one entity. A multitude of organizations are in the standards-setting and conformity assessment process. While there is no single government agency that is responsible for standards policy, the National Institute of Standards and Technology (NIST) is the leading agency expert in the area of technology standards and industry standardization issues. Witnesses discussed recommendations made in the National Research Council's report, released March 1995, entitled, *"Standards, Conformity Assessment, and Trade in the 21st Century."*

The hearing consisted of two witness panels. The first panel included witnesses from the National Research Council, NIST, and the American National Standards Institute. Witnesses on the second panel were representatives from United States industry. They

discussed the private sector's involvement in the standards-setting and conformity assessment process.

Summary of hearing

Panel 1

Dr. Gary Hufbauer, Senior Fellow at the Institute for International Economics, testified as Chairman of the National research Council's International Standards, Conformity Assessment, and U.S. Trade Policy Project Committee. The Committee was responsible for the research and development of the report. He stated that the Committee looked at two areas: the voluntary consensus standard setting system and conformity assessment, and the system for measuring and certifying conformance to standards. While the report found that the standards development process works well, the NRC recommended several changes in the conformity assessment system. Dr. Hufbauer said the conformity assessment system has unnecessary duplication among federal and local governments. The Committee's recommendations, he explained, give the National Institute of Standards and Technology the lead role by assigning them the responsibility of phasing out federally operated conformity assessment activities and asking them to work with state and local governments to eliminate duplicative accreditation systems.

Ms. Amy Marasco, Vice President and General Counsel of the American National Standards Institute (ANSI), stated that the OMB Circular A-119 needs Congressional backing to be effective. She said it is in the best interests of the nation to require federal employees to participate in the voluntary consensus standards process and require federal agencies to adopt voluntary consensus standards whenever it is practical and feasible.

Dr. Belinda Collins, Director of Standards at NIST, testified that the Federal Government's role in the standards process is to be both a partner and a participant with the private sector. She stressed that NIST is looking forward to coordinating activities in the standards process, but that NIST should not be "policing" activities. She stated that recognizing NIST as the lead agency for coordinating conformity assessment activities is a positive step there has not previously been any federal agency assigned to that task, and conformity assessment is much more of a decentralized complicated activity than standards development.

Panel 2

Dr. Louis Dixon, Automotive Safety and Engineering Standards of Ford Motor Company, testified about the importance of efficient conformity assessment. He said manufacturers and consumers are significantly affected by the cost of redundant conformity assessment activities. He added, "Where certifications are required, certifications should be based on one assessment, from one location, and should be acceptable anywhere in the world."

Mr. Gerald Ritterbusch, Manager of Product Safety and Environmental Control at Caterpillar, Inc., testified regarding changes needed in the conformity assessment process. He stated the public sector should handle assessment and accreditation, and the Federal

Government can step in at the recognition level. Government support, he said, is absolutely essential.

Mr. Walter Poggi, President of Retlif Testing Laboratories and representing ACIL, stated he was testifying as a small businessman and that he disagreed with some of the NRC's recommendations. He said he does not think it is practical for every federal agency to stop performing conformity assessment activities and indicated it is counter to the international trend. He also felt the standards development process is slow, costly and discriminates against small business.

Mr. Stephen Oksala, Director of Corporate Standards at Unisys Corporation, said he agreed with most of the NRC's recommendations and stressed the importance of industry leadership in the standard development partnership. He said, "Move the standards and conformity assessment infrastructures from the public to the private sector, and let the Federal Government concentrate on supporting that process through participation, recognition, and harmonization."

Mr. Rod Lee, Senior Vice President of Lithonia Lighting, and representing the National Electrical Manufacturers Association (NEMA), provided testimony regarding the lighting fixture industry as an example of a government agency mandating a standards policy and not using the voluntary consensus standard system. He stated that the government is mandating that lighting equipment be provided in modular, metric increments. He explained that the manufacturer's current standardized tool cannot produce the hard metric fixture, required by government regulation, and it will be extremely expensive to adhere strictly to the federal guidelines. In addition, he added, the lighting industry does not believe there is any value added to the industry in adopting nonstandard equipment only for the government, while the private sector has not indicated any demand for the hard metric fixtures.

4.5(f)—Cyberporn: Protecting Our Children from the Back Alleys of the Internet

July 26, 1995

Hearing Volume No. 104-16

Background

The Subcommittees on Basic Research and Technology met jointly on July 26, 1995, to explore the ramifications of cyberporn in our society. This hearing, entitled, "Cyberporn: Protecting Our Children from the Back Alleys of the Internet," began as the first in a series of hearings focusing on the Internet and issues affecting high performance computing and communications, and the information highway. (See also page 95.)

The Internet has become the gateway for information, education, and entertainment. As more and more users participate on the Internet, it is also becoming a forum where children have been exposed to obscene and pornographic material. This access to pornography has greatly disturbed parents, Congress, and the American public. This proliferation of pornographic and obscene materials

available on the Internet is one of most difficult issues confronting Internet use. Before identifying a new role for government, the hearing provided for a discussion of methods already available in the private-sector marketplace to allow users and on-line service providers to control the types of materials coming into homes, schools, and businesses. The hearing also provided Members with a full understanding of solutions already available before upcoming Congressional consideration of new government regulation or new criminal laws regarding pornography and the Internet.

The hearing was composed of two witness panels. Witnesses on panel one represented commercial on-line Internet providers who have been developing new technologies to block access to pornography. These efforts include making available screening software, such as SurfWatch, which prevents the computer on which it's loaded from accessing sites on the Internet known to contain sexual content. This software works by matching a potential Internet destination to a proprietary list of forbidden sites. For example, an attempt to browse through a pornographic Web page results in a screen reading, "Blocked by SurfWatch."

Panel two witnesses, comprised of various legal entities, discussed prosecuting child pornography and distributors of obscene material across state lines, which is already illegal under federal law. Since this is a new medium, there may be difficulties and peculiarities involved in its prosecution.

Summary of hearing

Panel 1

Mr. Tony Rutkowski, Executive Director, Internet Society, testified that the Internet has grown from an enormous, creative grassroots environment. Legislation already in place is sufficient, according to Mr. Rutkowski, because only a small percentage of the overall traffic flow on the Internet is of an objectionable nature. Because of its very size and scope, he stated that the Internet would be almost impossible to police—that such traditional regulation would invariably create more damage, especially in terms of international involvement and the complexities of multiple jurisdictions at that level. He emphasized an important fact which cannot be ignored—the Internet is "poised to emerge as a major backbone of the global economy."

Ms. Ann Duvall, President, SurfWatch Software, Inc., describes the Internet as a "pioneering community" which serves as a social tool, as well as a technological tool and it was in this interest that SurfWatch was born. Though she feels that it is unusual for a technological product company to be involved as a solution to the societal hazards presented by the Internet, she recognizes that private industry will have a large role to play in the spectrum of troubleshooting techniques for the Internet, responding to the evolution generated by Internet's rapid development. She acknowledges the importance of parental control in choosing the information they deem appropriate for their children to view. Thus, the SurfWatch Manager database is ideal for unsophisticated users because of the frequent updates to the database and the simple design of the system. She reiterated Mr. Rutkowski's stance that government regu-

lation might destroy the global opportunities afforded by the Internet, especially in light of the fact that 30% of the sites blocked by SurfWatch originated outside United States jurisdiction. She emphasized that parental guidance and education are the best tools with which to monitor the Internet and safeguard our children.

Mr. Steven Heaton, General Counsel and Secretary, Compuserve, stressed that the key to securing the Internet lies in customizing personal computers, because that is the primary point of convergence of all on-line activities. Compuserve is evaluating the use of several software technologies as solutions to be applied for this purpose, including SurfWatch, NetNanny, Cybersitter, and Internet-In-A-Box. This allows freedom of choice for parents, educators, etc., to decide what is acceptable and unacceptable information to access. He states that Compuserve's goal is to empower users, specifically parents, through education and technology. He observed that existing obscenity laws are more than satisfactory in dealing with the criminal element whose specialty is concentrated in "computer media" and that the role of government should be in educating users to the risks and benefits of the online environment, to legislate the policy of individual responsibility in this arena, and to encourage development of new technologies in cyberspace.

Panel 2

Mr. Kevin Manson, Legal Division of the Federal Law Enforcement Training Center (FLETC), testified regarding his operation of CYBERCOP, a non-governmental, not-for-profit Bulletin Board System, whose mission is "networking and education on the electronic frontier." He stated that law enforcement is rapidly finding itself overtaken by technology of the future. He said the solution to problems associated with computer-porn will be found in new partnerships between business and law enforcement.

Mr. Mike Geraghty, Trooper, New Jersey State Police, stated that pedophiles are using the Internet as a new means to distribute information. He said the laws are already in place to assist in catching computer criminals, it is the training of law enforcement personnel that needs to be addressed. He explained that it is crucial for law enforcement to keep up with the technology.

Mr. Lee Hollander, Assistant States Attorney, Naples, FL, testified that the law is developing in this area. A lot of issues must be considered, he added, including the Fourth Amendment Search and Seizure, obscenity laws, and jurisdictional issues.

4.5(g)—The Impact of Government Regulatory, Tax and Legal Policy on Technology Development and Competitiveness

September 28, 1995

Hearing Volume No. 104-18

Background

On September 28, 1995, the Subcommittee on Technology held a hearing entitled, "The Impact of Government Regulatory, Tax and Legal Policy on Technology Development and Competitiveness," to receive testimony regarding government policy instruments and

their impact on technology development, commercialization and competitiveness. Regulatory, tax and legal policies strongly affect the private sector's ability to take technology to the market and create jobs, wealth and a higher standard of living.

The hearing consisted of two panels. Witnesses included representatives from major R&D companies and selective policy groups.

Summary of hearing

Panel 1

Mr. Philip Howard, author of the *Death of Common Sense,* testified regarding the burdens of regulation on industry. He said that the law and regulations have not adjusted to the changing needs of technology. He spoke about three specific problems affecting technology including: the lack of a coherent antitrust policy for technology; outdated laws for intellectual property; and government contracting rules. Risk is half of life, Mr. Howard said, but our system today allows one to sue just because a risk they are pursuing doesn't pan out. He added that judges today don't view their job as safeguarding reasonableness.

Dr. Allan Mendelowitz, of the General Accounting Office (GAO), stated without increasing productivity the country cannot sustain over the long run a rising standard of living. He testified that when regulation is used to achieve public policy objectives it imposes costs on the economy in the goods that are produced. He added that is it essential the government carefully consider the impact of regulatory activity on productivity, efficient use of resources, and ultimately the standard of living for Americans. Regulations, he said, have as direct, and as significant of an impact as the direct expenditure programs of the government.

Panel 2

Dr. Judith Giordan, Vice-President of Research & Development at Henkel Corporation, testified that regulation needs to assist the full innovation process. She said the tax credit is an important tool to improve productivity, but not the means to an end. She stressed the importance of training programs to help create a positive feeling about science, and also the importance of funding university research.

Mr. Jesse Greene, Vice-President and Corporate Treasurer of Eastman-Kodak Company, commented on the importance of flexibility in regulations so manufacturers have the ability to meet the market needs. He suggested that by making the R & E tax credit permanent and for a higher percentage rate the credit would have a much bigger influence on major research and development projects. Mr. Greene stated that if the United States wants to sustain its research and development it is very important for Congress to recognize the need for incentives. Companies, he added, are under high pressure to move overseas because of tax incentives and market opportunities.

Dr. Francis Kapper, Director of Advanced Government Programs at Corning Incorporated, testified regarding the lost opportunity costs of regulation which are rarely calculated. Congress should

look at product liability, he said, it greatly affects a company's long-term investment decisions.

Dr. Daniel Garner, President of Cellmark Diagnostics, testified about the importance of regulation in some areas, but also stressed the negative effects of regulation. Currently, he stated, it takes his company an average of 12 years and $400 million dollars to bring a product to market. He said streamlining the regulation process would be most important to Cellmark. He also stated that product liability is a major discouragement to investing in the United States.

Dr. Thomas Lenard, Senior Fellow, Progress and Freedom Foundation, spoke specifically about the high-technology sectors of the medical industry and environmental technologies. He stated that in these areas the government has a single gateway for market entry, and this creates an adverse incentive for innovation. If regulations are made reasonable, he said, it will help diminish the time required to bring a product to market and that will provide a strong incentive for more R&D. He stated that the current regulatory framework adversely affects innovation, especially where technological opportunities are the greatest.

Mr. Andrew Wyckoff, Program Director at the Office of Technology (OTA), spoke about the importance of regulation for assuring the public of the safety of new innovations, such as airplane equipment. He commented on the recent study done by OTA which concluded that the R & E tax credit worked reasonably well at incenting R&D. But, he added that the type of R&D it generates is R&D the company is already doing, it does not change the allocation of R&D.

Mr. Dan Mitchell, Senior Fellow at the Heritage Foundation, testified about the negative impact our tax system has on innovation. American firms are not short-sighted, he said, except when the government policies drive them that way. He said it is common for capital to be taxed two, three and four times under our current tax system.

4.5(h)—The Malcolm Baldrige National Quality Awards Program: An Oversight Review From Its Inception

October 18, 1995

Hearing Volume No. 104-21

Background

On October 18, 1995, the Subcommittee on Technology held a hearing entitled, "The Malcolm Baldrige National Quality Awards Program: An Oversight Review From Its Inception," to receive testimony from industry witnesses regarding the effectiveness and the future of the Malcolm Baldrige National Quality Awards Program. This program was developed by Congress in 1987. It is administered by the National Institute of Standards and Technology (NIST), with assistance from the private sector. The program raises awareness of quality management by recognizing United States companies that have successful quality management systems. Two awards are given in the following categories: manufacturing; serv-

ice; and small business. NIST is test piloting two additional categories in the health care and education industries. H.R. 2405, the Omnibus Civilian Science Authorization Act of 1995, authorized the program for Fiscal Year 1996 at $3.4 million which equals its current budget. The hearing was structured into two panels.

Summary of hearing

Panel 1

Dr. Joseph Juran, Juran Institute, testified about his 70 years experience in the field of managing for quality. He said the United States is in a quality crisis because we are being outperformed by the Japanese. He added that Japan would not be an economic superpower with their quality revolution. The Juran Institute provides grants to NIST for the Baldrige Award.

Mr. John Hudiburg, former CEO of Florida Power and Light, and Director of the Foundation for the Malcolm Baldrige Award, stated that "modest investment" by the U.S. Government, in the Baldrige awards, has brought American industries up to world-class levels. Since Mr. Hudiburg has been involved with the Malcolm Baldrige Awards program from the beginning, he has seen bipartisan support for this program. He said much of the support comes in the form of volunteers who receive training from the Malcolm Baldrige Awards office and then take the knowledge back to their own companies.

Mr. Ray Stata, Chairman of the Board and CEO of Analog Devices, stated the Malcolm Baldrige Awards has been imperative in strengthening U.S. competitiveness. He made recommendations to broaden the Malcolm Baldrige Award program's responsibilities and rename the program, as well as extending the program out to small and medium-size enterprises. He felt NIST could do more to increase awareness of the importance of the Malcolm Baldrige Awards.

Mr. William B. McBee, Director, Corporate Quality, Armstrong World Industries, winner of the 1995 Malcolm Baldrige Award, testified that Armstrong won the award this year because it has taken the Baldrige criteria and applied it to their Quality Improvement Process thereby creating world class standards. He stated that NIST does an excellent job in keeping the standards up to date. Armstrong has a facility in Chairman Walker's district.

Mr. Martin Mariner, Director, Quality, Corning Incorporated, also 1995 Malcolm Baldrige Award winner, stated that the Baldrige self-assessment criteria helped to identify areas that Corning had to improve upon in order to be a world class competitor. By adopting this way of doing business, he said, they not only improved quality but have improved growth, market-share, employee base, etc. He spoke of supporting the education and health care pilots since the award has such a positive impact on the country's business community.

Panel 2

Mr. Curt Reimann, Director of Office of Quality Programs, testified that NIST is working to increase private and public sector volunteerism, and contributions. The Baldrige Award evaluation proc-

ess has given the world a method to compare and assess organizational performance. He stated, "The explosive growth and diversification of the Baldrige Award have changed what we do and how much we do." By making applicants pay for the whole program, he said, it would completely miss the program's purpose and operational strategy. He added that it would not be fair to make a few donors pay for the benefits of the many participants. The program has been non-partisan since it began, he stated, and the current fee system works now because the fees are commensurate with the benefits.

The Honorable Clarence J. Brown, former Deputy Secretary of Commerce, testified since Malcolm Baldrige was a strong supporter of private funding, he would not want an award in his name to be funded by taxpayer dollars. He stated that most universities only teach management courses in the curriculum, instead of production. He said business schools should teach production methods and share their findings with others.

Ms. Ellen Gaucher, Senior Associate Director of University of Michigan Hospitals, stated her involvement in the Malcolm Baldrige Award program has increased quality at the hospital where she works. She added that if the results from the business arena can be duplicated in the health care field, then Americans will get a better quality health care that is more cost effective.

Mr. John P. Evans, Professor at University of North Carolina at Chapel Hill, testified that the Malcolm Baldrige Award is helping improve education just with its test pilot. Many organizations are sharing the information they are learning. Having the President and Department of Commerce associated with the award, he stated, increases the prestige associated with receiving the award.

4.5(i)—Medical Technology Development and Commercialization

November 2, 1995

Hearing Volume No. 104-26

Background

The Subcommittee on Technology met on November 2, 1995, to explore next-generation medical technologies and examine tax, antitrust, regulatory and other legal and governmental policies as they relate to medical technology development and commercialization. The hearing, entitled, "Medical Technology Development and Commercialization," was followed by a 21st Century Medical Technologies Fair highlighting cutting-edge developments in health care technologies.

The hearing consisted of a Congressional panel and two witness panels.

Witnesses on panel one represented various sectors of the medical technology industry and discussed the impact of government policies on medical technology development and commercialization.

Panel two witnesses discussed next-generation medical technologies incorporating telemedicine, micro-robotics, "smart" devices and 3D imaging.

Summary of hearing

Congressional Panel

Congressman George W. Gekas (R-PA), co-Chair of the Congressional Biomedical Research Caucus, testified regarding restrictions FDA placed on importing medical devices already on the market overseas. He added that these import hurdles have nothing to do with how the product works, and they cause foreign firms to reconsider developing manufacturing plants in the United States. He also addressed the need for product liability reform.

Congressman Bill Baker (R-CA), testified regarding FDA's role to protect society, not prevent society from technologies that may not work for everyone. He stated, "We want to be protected, we just don't want the government saying to us, if it works for you, I'm sorry it didn't work for everyone, you can't be protected." As an example, Mr. Baker testified regarding *Sensor Pad,* a device women can use for breast self-examinations. Even though the device is not marketed as a replacement of a mammogram, he said, the FDA has delayed the device for 10 years, stating the device would give women a false sense of security because it is not as accurate as a mammogram.

Panel 1

Dr. Peter Chevalier, Vice-President and Chief Quality and Regulatory Officer at Medtronic Inc., testified as a patient and a businessman. He said he was unable to get the best technology for his heart condition in the United States, even though the technology was available in Europe. He stated the delays come from the process of reviewing data for medical device and drug clearance. He added that the gap between commercial availability of new therapies in Europe and the United States often exceeds 3 years. He indicated that current regulations in the United States have forced many companies to move their R&D and manufacturing overseas.

Mr. David Holveck, President and CEO of Centocor Inc., said FDA's classification of medical devices are not consistent with the risk compared to the benefits. He stated that in a competitive global market U.S. companies are at a disadvantage due to regulations which are very different from the rest of the world. He said overregulation of the domestic biotechnology industry limits the access of American patients to the most cutting-edge technologies.

Mr. Alan Magazine, President of Health Industry Manufacturers Association (HIMA), testified that while he is not in favor of eliminating the FDA, he does believe great reforms are needed. He said it is crucial that manufacturers, especially small businesses, have some sense of when they can go to market. Currently, he stated, the timing is very inconsistent and can often take many, many years. He discussed FDA's "zero-risk mentality"—they allow no approval without absolute proof no risk exists. However, he said, science is not absolute, therefore potential risks should be balanced with potential benefits.

Mr. J.J. Finkelstein, President and CEO of Cyromedical Sciences Inc., testified regarding his companies difficulties in getting FDA approval of a simple medical accessory. He stated the company spent over three years and thousands of dollars obtaining clearance

for a simple accessory, and as a patients result unnecessarily received sub-optimal care. He said the FDA is unable to develop and implement sound policy.

Mr. Richard Pops, CEO of Alkermes Inc., provided the view of a small biotechnology company. He said the biotechnology industry is one of the most research-intensive industries, and typically invests $250 to $400 million in a drug before ever receiving any profit. He explained that small biotechnology firms develop drugs for diseases that have unmet clinical needs and are difficult to treat. He added that Europe has generally had a much more "generous attitude" towards new drugs to treat these types of diseases since patients are living with a very poor quality of life or dying.

Dr. Jeffrey Brinker, Director of Intervential Cardiology at Johns Hopkins Hospital, has served as a mediator between industry and the FDA many times. He stated the FDA has the responsibility to protect the public and insure that devices and drugs are safe and effective. He said a lot of the problems industry has with the FDA are results of industry shortcomings. He stated many of the difficulties could be overcome through communication.

Panel 2

Dr. Harvey Eisenberg, Chairman and CEO of Health Services Corporation; Dr. Ian Hunter, Associate Professor at the Massachusetts Institute of Technology; Dr. Steven Jacobsen, Professor at the University of Utah; and Mr. Kenneth Kaplan, Architect and Principal Research Scientist at the Massachusetts Institute of Technology testified as a group working to revolutionize the national health care industry through advanced technology development. They said technology can support major advances in the quality of health care and reduction of cost on a national scale, but many Americans have limited access to advanced health care because of economic or geographic constraints. They discussed the importance of developing a plan and strategy to achieve the accelerated development and implementation of advanced medical technologies.

4.5(j)—An Industry Perspective of Federal Aviation Administration Research & Development Programs

December 7, 1995

Hearing Volume No. 104-38

Background

An initial hearing, entitled, "An Industry Perspective of Federal Aviation Administration Research & Development Programs," was held on May 16, 1995, regarding the FAA's acquisition management. According to the testimony provided, it appeared that the major issues are not the budgeted money or how it is allocated, but FAA's long-standing internal management and cultural impediments to improving their acquisition process. Major improvements to the National Airspace System (NAS) will require fundamental changes in FAA's acquisition management.

The hearing was structured into two panels. The first panel consisted of representatives from industry. Panel two witnesses represented the Federal Government.

Summary of hearing

Panel 1

Dr. John J. Fearnsides, Senior Vice President and General Manager of the MITRE Corporation, testified that the FAA needs more than acquisition changes. He said FAA should examine its decision making process from the top management down and create an integrated product team in small steps. He stated that the FAA needs to bring technology into the field instead of just investing in it.

Mr. Robert J. Stevens, of Loral Federal Systems, stated that his company is "absolutely on schedule" with the restructuring of the display system program. By October of 1998, he said, the new software and hardware will be operational at the Seattle test sight. He mentioned the need for IPT's to ensure quality from the top down.

Mr. J. Roger Fleming, Senior Vice President of Air Transport Association, testified that the FAA has no sense of urgency about the current problems it faces and therefore needs more accountability. Money is not the only problem, he stated the FAA needs to direct its resources to the highest priority programs. He also said the Administrator needs to take the initiative to eliminate unsuccessful programs. He suggested that the FAA simplify its regional establishments and make adjustments in its personnel and procurement procedures.

Mr. Sigbert B. Poritzky, former member of the FAA R&D Advisory Committee, stated that decisions must be made "hands on," in a timely manner by dedicated upper level management personnel using more than one element. He testified that it is imperative the FAA display a willingness to work together and innovate. To understand how the organization operates, he suggested, qualified experts should be rotated to the different divisions to demonstrate how important it is to work together.

Panel 2

Dr. Robert E. Whitehead, Office of Aeronautics—National Aeronautics and Space Administration (NASA), testified that the FAA and NASA are working jointly to develop technology for air traffic control. He stated that they are pursing environmental topics like weather and noise reduction. He testified that for NASA to be an equal partner of the FAA, a clear unified strategy needs to be established.

Dr. Alan R. Thomas, of the National Oceanic and Atmospheric Administration, stated that the FAA needs to focus R&D on operations and the process used to get from one to the other. He said if he could make changes at the FAA, he would use a quality management approach to give the customers what they want and address the internal coordination issue.

Mr. William "Bud" Laynor, National Transportation Safety Board, testified that his organization relies on FAA for information regarding R&D. He said the FAA needs to address issues as they arise instead of putting them off. He also said the more planning

should go into the budget, and he would like to see better coordination and stability in management.

4.5(k)—Rail Safety Oversight: High Technology Train Control Devices

March 30, 1996

Hearing Volume No. 104-55

Background

The Subcommittee on Technology and the Subcommittee on Railroads of the Committee on Transportation and Infrastructure held a joint hearing entitled, "Rail Safety Oversight: High Technology Train Control Devices," on March 30, 1996, to receive testimony regarding advanced train control systems (ATCS). Witnesses discussed advanced train technologies and their practicality and availability in preventing train accidents and collisions. The hearing included testimony regarding the priorities for future research, development, and applications of train control technologies.

The hearing consisted of two panels. Witnesses on the first panel represented government agencies. The second panel included witnesses from railroad organizations.

Summary of hearing

Panel 1

Ms. Jolene Molitoris, Administrator, Federal Railroad Administration (FRA), testified that the FRA is committed to supporting the development of advanced train control (ATC) technology. She said to move ATCS forward FRA has developed a partnership approach with the railroad industry by challenging the railroads to help with the development of ATC technologies. Ms. Molitoris stated that the FRA is partnering with the Federal Highway Administration to ensure positive train control (PTC) issues are included in the intelligent highway systems initiative. In addition, the FRA is working with the Coast Guard and the Department of Defense to broaden coverage of global positions systems (GPS) for PTC. She also added that the FRA is currently involved in three testing locations.

Mr. James Hall, Chairman, National Transportation Safety Board (NTSB), stated that with the recent increase in railroad accidents there has been a reawakening in railroad safety. He said the railroads are safe, but could be safer and we should take this opportunity to improve rail safety. He testified regarding three areas where immediate action should take place: (1) the 1907 Hours of Service Act should be modified so the FRA has authority to regulate the hours of service for railroad employees—fatigue is a problem; (2) action needs to be taken to reduce the regulatory backlog at FRA; and (3) ATCS that will provide positive train separation (PTS) need to be put in place. He added that PTS has added advantages besides safety—increased rail line efficiency and utilization, savings in fuel use, reduced wear on equipment, and maintenance savings. Mr. Hall also said reforming of radio frequencies,

which the FCC is considering, may cause interference and will negatively impact the safety of rail communications.

Panel 2

Mr. Edwin L. Harper, President and Chief Executive Officer, Association of American Railroads (AAR), stated that AAR is concerned that, "Government . . . may impose some inappropriate mandate that could dispose or constrain the private investment and R&D policy that has proven its worth." He testified that it would be a mistake for railroads to invest in PTS, and that government should set levels of safety performance based on risk assessment. He stated that currently four PTS projects are in development in North America and hopefully these projects will answer the technical questions about PTS and its commercial viability.

Mr. Dennis Sullivan, Chief Operating Officer, National Rail Passenger Corporation (Amtrak), said the Washington to Boston corridor will have the most advanced safety system in North America, which is an adaptation of European technology. He stated that the northeast corridor moves about 1,000 trains a day, thereby making it the busiest track. The current Centralized Traffic Control (CTC) system, he testified, needs to be improved in high-speed rail. He said the biggest safety problem is grade-crossing accidents, but when the high-speed rail project is completed only 12 grade-crossings will be left on the northeast corridor.

Mr. Daniel Froth, Executive Director-Commuter Rail, American Public Transit Association, stated that despite the recent accidents the railroads have one of the best safety records in all of transportation. He testified that, "to improve safety, commuter railroads need a comprehensive research effort similar to that of the AAR that specifically involves and benefits commuter rail operations." He said Congress needs to take the lead on commuter research and development by providing federal funds to study prevention of accidents, instead of crashworthiness. Lastly, he commented about the difference between commuter operations from both freight and Amtrak operations.

Mr. W.D. Pickett, President, Brotherhood of Railroad Signalmen (BRS), testified that Amtrak utilizes more of the available technology than other rail users. He stated, "If the FRA and rail industry are really serious about safety, instead of touting positive train separation or positive train control, the application of proven cab signal and speed control equipment would be installed." PTS or PTC, he stated, are still concepts which have flaws that need to be worked out before they could be placed into actual use.

Mr. Dean P. Huntsinger, General Manager, Rockwell Railroad Electronics, testified regarding Rockwell's involvement in developing ATC technologies. He said that Rockwell, partnered with Burlington Northern Railroad, developed over ten years ago an ATCS test in Northern Minnesota called ARES. The testing found that having a positive train control system can reduce human error from 100 to 1. Mr. Huntsinger said the technology is available today, and added that Rockwell and Burlington Northern have been active in trying to market it.

Mr. William L. Matheson, Technical Director of Advanced Railway Systems, GE-Harris, explained that GE-Harris formed a rail-

way electronics joint venture last year to develop electronic systems to assist in management of traffic flow through the rail network. He said the joint venture, with Burlington Santa Fe and Union Pacific, recently began developing a PTS system. He testified that a pilot PTS system will be installed this summer on an 800 mile track in Washington. He explained that this area was chosen because it includes track operated by both the Burlington and the Union Pacific and contains many types of signaling systems. He said the pilot system demonstrates the combining of resources from many groups who are working to achieve the goals of improved safety and productivity on the railroads. However, he added that at this point it is premature to mandate this technology until it has been fully tested and proven.

4.5(l)—Authorization Hearing of the Technology Administration/National Institute of Standards and Technology for FY97

April 16, 1996

Hearing Volume No. 104-14

Background

On April 16, 1996, the Subcommittee on Technology held a hearing entitled, "Authorization Hearing of the Technology Administration/National Institute of Standards and Technology for FY97," to receive testimony regarding the Fiscal Year 1997 budget for the Technology Administration (TA) and the National Institute of Standards and Technology (NIST).

The tragic death of Commerce Secretary Ron Brown forced the postponement of the previously scheduled field hearing at NIST, and to lessen the burden on NIST's staff during this time of mourning, the hearing was rescheduled and consisted of a single panel with one witness, Dr. Arati Prabhakar, accompanied by Mr. Gary Buchula.

Summary of hearing

Dr. Arati Prabhakar, Director of NIST, stated that two major factors are shaping our economy: globalization of the marketplace; and the rapid pace of technological change. She testified because of these changes companies are shifting to narrower and more focused research and development, and smaller manufacturers are having a harder time keeping pace. Dr. Prabhakar stressed the importance of the Office of Technology Policy and the Technology Administration because of their "unique" programs. She stated that NIST receives only about 1 percent of the $70 billion the Federal Government spends on R&D. She added, "I believe that there is no other part of the [federal] investment that delivers more economic bang for the buck." She explained that NIST has four major programs: the laboratories which provide a common language measurement to support manufacturing and commerce; the Advanced Technology Program (ATP); the Manufacturing Extension Program (MEP); and the Malcolm Baldrige Quality Award Program. The requested funding for construction, she added, is necessary to support NIST's basic research laboratory mission.

4.5(m)—Federal Aviation Administration—Research, Engineering, and Development Fiscal Year 1997 Authorization and Management Reform

April 18, 1996

Hearing Volume No. 104-46

Background

On April 18, 1996, the Subcommittee on Technology held a hearing entitled, "Federal Aviation Administration—Research, Engineering, and Development Fiscal Year 1997 Authorization and Management Reform," to receive testimony regarding the President's FY97 budget request for FAA Research, Engineering and Development (RE&D), and to review the management reform initiatives directed toward improving FAA's RE&D activities. The hearing consisted of one witness panel.

Summary of hearing

The Honorable David R. Hinson, Administrator, Federal Aviation Administration, testified that after reviewing the proposed bill he firmly believes that, "the management and organizational changes made over the past year in conjunction with the new acquisitions management system that went into effect on April 1st, fully address the Committee's concerns." He stated the first key to the new organization system is IPT's (Integrated Product Teams) which bring together representatives from various disciplines. The second element is early involvement of customers and aviation representatives to help define, develop and implement requirements. The third element is the introduction of corporate level oversight mechanisms which include continual independent reviews and evaluations of all major acquisition programs. He said that since beginning the streamlining process, internal regulations and directives governing acquisition have been reduced by 50 percent. He also stated that the FY97 request for RE&D is $195.7 million—a five percent increase above the 96 appropriation. This amount he said will enable the FAA to continue R&D in several critical areas including aircraft and airport safety, air traffic control, and hazardous weather.

Dr. George L. Donohue, Associate Administrator, Research and Acquisitions, Federal Aviation Administration, testified that significant progress has been made with the new acquisition management system. He noted progress in the area of requirements, and the simplified procurement procedures, as well as the cradle-to-grave responsibility and accountability by IPT's. He stated that one of the "big cultural changes for the FAA is to try work their systems around what can be bought affordably rather than to state their procedures and then have to develop something to meet their procedures." He testified that market surveys are now used to develop a listing of qualified vendors instead of having full and open competition which required a lot of staff time dealing with individuals who would like to become manufacturers, but had no demonstrated track record. Now previous performance is used as criteria for contractor selection. He stated that he is the FAA's acquisition execu-

tive and he is "accountable for the success of the acquisition process, the training of FAA professionals, and the deliverance of their product." He is also responsible for the management team which equip the IPT's. The new management system, he stated, will enable the FAA to make a smooth transition from air traffic control to air traffic management.

4.5(n)—Oversight Review of Research Laboratory Programs at the National Institute of Standards and Technology

May 2, 1996

Hearing Volume No. 104-43

Background

On May 2, 1996, the Subcommittee on Technology held the first of a series of hearings to receive testimony regarding the laboratory programs at NIST. The hearing, entitled, "Oversight Review of Research Laboratory Programs at the National Institute of Standards and Technology," reviewed NIST's mission of promoting the nation's economy by working with industry to develop technology, measurements, and standards. This hearing focused on evaluating the Physics Laboratory (PL) and the Chemical Science and Technology Laboratory (CSTL) by examining each in a separate panel.

Summary of hearing

Dr. Katharine Gebbie, Director, Physics Laboratory, NIST, testified that, "Physics is at the heart of what is the very core of all physical measurements and standards: voltage, length, time, frequency, temperature, the measurements and standards that the United States mandates to be a federal responsibility." She stated that by providing measurements services and support for the electronics, optical, and radiation technologies the Physics Laboratory is able to support the United States industry, government, and scientific community. To anticipate future needs of time and frequency measurements, she testified that the Physics Laboratory has a fundamental program in atomic cooling and trapping of atoms and icons. This program created the Bose-Einstein Condensate, a new form of matter that had been predicted seventy years ago but never observed.

Dr. C. Kumar Patel, Vice Chancellor, Research Office, University of California, testified that the Physics Laboratory at NIST "interfaces strongly with the academic and industrial scientific community." He cited four mechanisms that are connected with academic and industrial scientists, as well as Physics Lab scientists at NIST. The first is the Visiting Fellows Program which allows industrial scientists to utilize the NIST laboratories. He stated that Congressman Vern Ehlers was a member of this program in his prior career as a physicist. The second is the NIST Graduate Student Program which lets students do their theses while working with world class scientists. The third program is a Joint Experimental Activity between NIST scientists and academic faculty members which let the academic scientist use NIST experimental facilities. Fourth is the unique contribution that the Physics Laboratory makes to various

academic and industrial R&D scientists through providing instrumentation calibration.

Dr. Buhdatt Palliwal, Professor of Human Oncology, University of Wisconsin, testified that information received from NIST impacts about 1,000 cancer patients a year because all of the instrumentation, treatment machines, and radioactive isotopes which derive their fundamental calibration from the procedures and cooperation that NIST provides. He emphasized the critical example of credibility of measurement standards that are utilized in the mammography procedures. The implementation and standards have been high, he stated, due to the accountability and traceability through the national standards.

Dr. Hratch Semerjian, Director, Chemical Science and Technology Laboratory (CSTL), National Institute of Standards and Technology, testified that the CSTL provides three "essential and unique functions for the Nation." First, CSTL provides the fundamental basis for the nation's measurement chemistry, chemical engineering, and biotechnology. He stated that by providing standard reference materials and calibration services, it ensures traceability of measurements. Second, CSTL provides accurate and reliable information in the form of data predictive tools to industries such as biotechnology, petrochemical, and semiconductor. Third, CSTL partners with industry and professional organizations to identify and address the next generation measurement needs of the United States industry. He also highlighted the work CSTL has done with cholesterol measurements and testing.

Dr. Isiah Warner, Immediate Past Chair, National Research Council Board on Assessment of NIST Programs, testified that the panel found the CSTL programs to be of the "highest technical quality," while addressing the critical national needs. He stated that one of the challenges the laboratory faces is the danger of losing critical expertise in areas where NIST has unique capabilities and responsibilities. Besides staff retiring the problem, he stated, is that many projects are carried out by non-permanent staff. The long-term effects of such personnel policies are uncertain. He also said the need for evaluative data continues to grow, the laboratory's current efforts are not sufficient to meet the growing demand.

Dr. Rita Cowell, President, University of Maryland Biotechnology Institute, testified about the relationship between NIST and the CARB. She stated that the methods and standards are being developed to accurately characterize DNA profiles for forensic uses as well as DNA sequencing. As an example of the NIST/CARB partnership she mentioned the development of a biological macro molecule crystallization data base, which was one of the first NIST data bases to be put on the web with a searching capability. She testified that in a time of downsizing, it must be recognized that areas like biotechnology are growing, and therefore should not be cut off, but given room for growth.

4.5(o)—Solving the Year 2000 Software Problem: Creating Blueprints for Success

May 14, 1996

Hearing Volume No. 104-48

Background

On May 14, 1996, the Subcommittee on Technology held a hearing entitled, "Solving the Year 2000 Software Problem: Creating Blueprints for Success," to receive testimony assessing the computer problems associated with a two-digit date field program, which is incorporated in virtually all government and private sector software. Witnesses from industry and government testified on the origin and extent of this potential computer catastrophe, and they discussed the government's role in correcting the problem. They also explored tools available in the private sector to correct the problem.

Summary of hearing

Mr. Peter de Jager, President/Owner of de Jager & Co., testified that the time available to correct the problem is fixed. The Year 2000 deadline is not negotiable and approaching quickly. In addition, the work must be done by December of 1998 so the changes may be tested in 1999 and corrections made. Since it is a shared deadline, everyone is trying obtain the same expert assistance. We need to promote awareness and begin working now. He also pointed out that, "regardless of how many programs you have to fix, the deadline is the same." He stated that sixty-five percent of North American businesses are unaware of this situation or have yet to address it. Also, he stated that the Gartner Group, an industry trend watcher, has been very conservative in their estimate of $30 billion to correct the systems. He stated that a government agency such as NIST needs to make a standard for others to follow.

Mr. Dean Mesterharm, Deputy Commissioner for Systems, Social Security Administration (SSA), testified that, "the solution to the problem is obvious but labor intensive." Implementing the corrections, he stated, sounds much simpler than it really is because there is no quick fix to the problem. The SSA is leading the Year 2000 Interagency Committee which had been trying to increase awareness of this urgent problem and suggest solutions for government agencies. SSA is leading the changeover by changing the formats of their major data databases and application software. He testified that SSA has already spent 100 manyears in effort to correct the dilemma, but they have about 500 manyears to go. He stated that SSA will shift funds in order to have enough money to address the problem. He stated that the challenge is greater in foreign countries where the level of awareness and automation is lower.

Dr. Robert Hebner, Acting Deputy Director, National Institute of Standards and Technology, testified that, "the standard that NIST has promulgated was the Federal Information Processing Standard, which adopted the voluntary standard that has in it the four digit code." He stated that NIST does not anticipate a problem with non-

compliance. Also, he emphasized the problem was more of a organizational nature than a measurement or standards issue. NIST sets the standard, but does not have an enforcement role. He stated that NIST was playing its role by raising awareness of the issue.

Mr. Barry Ingram, Chief Technical Officer, EDS Corporation, testified that, "systems that have significant needs for upgrades and modernization might best be suited for either selective re-engineering or redevelopment." He pointed out that companies should make an educated decision based on more criteria than just cost. He also stated that one of the biggest obstacles managers face is while the Year 2000 project is conducted, normal development maintenance efforts must proceed.

Ms. Barbara L. McDuffie, IBM Program Director of Solution Provider Programs, testified that IBM feels that companies need to move more aggressively to make these changes on time. She emphasized that the biggest challenge is making computer users aware of the problem, as well as management strategies to correct the issue. IBM is currently offering a planning and implementation guide to help their customers address this situation in a timely manner.

Mr. Marc Sokol, Vice President of Advanced Technologies, Computer Associates International, testified that the millennium date change can potentially cripple an organization's ability to execute its critical business function, thereby impacting everything from insurance calculations to electronic data transfer. He stated that, "selecting the right tools is an important step, but training is equally important." In order for companies to become more productive and address this problem they must take advantage of vendor-provided start-up services. Software tools help, he said, but there is no "silver bullet."

4.5 (p)—Proposed Amendments to the Metric Conversion Act

May 16, 1996

Hearing Volume No. 104-50

Background

The Subcommittee on Technology held a hearing on May 16, 1996, entitled, "Proposed Amendments to the Metric Conversion Act." The Subcommittee reviewed H.R. 2779, the Savings in Construction Act of 1995, introduced by Congressman Cox. H.R. 2779 allows for flexibility in the implementation of the current law by allowing "soft metric" conversion versus "hard metric" conversion under certain specified terms in bidding for federally-assisted construction contracts. Using "soft-metric" units the product itself remains the same size, but its dimensions are expressed in metric units. Therefore, it is considered a less costly and less intrusive way of meeting the goals of the Metric Conversion Act (P.L. 64-168).

The hearing consisted of three panels. Congressman Cox was the first panel and testified in support of his bill.

The second panel included representatives from the block and lighting industry. The witnesses discussed the need for flexibility

in construction metrication by using "soft metric" versus "hard metric" measurements, especially where there are cases of adverse economic impact and barriers to competition.

The third panel included individuals from the administration, industry, and metric community who testified regarding their concerns for the legislation.

Summary of hearing

Panel 1

The Honorable Christopher Cox (R-CA), testified regarding his bill, HR. 2779, "The Savings in Construction Act of 1995." He said he is a strong supporter of metric conversion, and that metric is a vast improvement over the current U.S. system. He stated that the question today is not about converting to metrics, it is about whether the government should mandate that commerce must be conducted in round "hard metric" numbers. He explained that his legislation has been narrowly drafted to address only the unnecessarily burdensome application of the existing law regarding federal construction projects. He testified that his legislation will clarify the current law and enable construction projects to be finished more efficiently and quickly. He also stated that his legislation will assist in reducing the costs to small business and taxpayers.

Panel 2

Mr. William Fabbri, Vice-President and General Manager of Lightolier, testified that when he started in the fluorescent lighting fixture industry over 2,500 companies existed, today due to automation and the capital investment required, six manufacturers now make over 80% of the fixtures sold. He said because of freight costs there are no imports or exports of any of these products outside of North America. He stated that his company would have no problem converting to "soft metric," but "hard metric" would require their products to be three-eighths of an inch narrower and three-quarters of an inch shorter. He explained that since all of his products are made with automated tooling "hard metric" would require a permanent change by retooling, which he estimated would cost the company $15 million. He added that because government jobs represent only 10% of his market, Lightolier could not justify spending the money to retool.

Mr. Rod Lee, Senior Vice President of Marketing at Lithonia Lighting, testified on behalf of National Electrical Manufacturers Association (NEMA) regarding the "hard metric" requirement for bidding on federal projects. He stated that the lighting fixture industry cannot produce the "hard metric" fixtures using their current standardized tooling, therefore additional tooling is required to produce a non-standardized product for only one customer—the Federal Government. He said industry-wide adoption of hard metric will not make the lighting industry more competitive internationally, since exports are practically nonexistent due to shipping costs.

Mr. Norbert Rappl, President of Comac Building Supply, stated that his concrete block company, which employs 25 people and has only one machine, studied the costs of converting to "hard metrics"

and found it would cost $183,000 to retool the plant. Moreover, he said the company would also have to keep double inventory, which he explained would cause errors in handling because the blocks would be so close in size. He also stated that due to the weight of the product they are confined to a 50-mile trading radius. He said his company could not afford to do the retooling and consequently could not bid on federally-assisted projects.

Mr. Donald Emich, President of Binkley & Ober, stated that his concrete block company is in the same situation as Mr. Rappl's. He said there is no reality in exporting their products world-wide. He explained that the Canadians have been producing hard metric blocks for almost 20 years and still have to carry double inventories, and make investments for mold parts in both English and metric.

Mr. Randall Pence, Director of Government Relations for the National Concrete and Masonry Association (NCMA), testified that NCMA supports the metric system, but is concerned with how we convert to the metric system. Currently, he stated, only a handful of block producers have the capability to make the "hard metric" blocks. He said that the current law forces a niche market for federally-assisted construction projects, and eliminates small and medium-sized producers who cannot afford to immediately produce the blocks. He explained that this will result in a tremendous amount of single-souring for government projects, which runs completely counter to the current initiatives to expand competition in the procurement area of the Federal Government. He also said use of "hard metric" increases costs to the taxpayer by requiring production of a specialty product.

Panel 3

Mr. Mark Bohannon, Counsel for Technology at the U.S. Department of Commerce, presented the views of the Under Secretary of Commerce, Dr. Mary Good. He stated that the Administration's position is to support the procurement of all commercially available products and pursue a strong metric policy consistent with the international global marketplace. He said the Administration is concerned with H.R. 2779 because they believe it will prohibit the use of metric products in federal construction projects. He said the current law provides flexibility to exempt federal agencies from the use of metric when it is impractical or causes significant inefficiency, and therefore this legislation is not necessary.

Mr. William Brenner, Director of the Construction Metrication Council, testified that almost all federal construction projects have come in under budget, and to date the government has had little trouble finding companies to produce the modular metric products at a reasonable cost. He said he would like to help develop an administrative remedy which would address the problems of the block and lighting fixture industries.

Mr. Tom Cunningham, Senior Project Manager at R.M. Schoemaker, testified regarding the project his company is currently working on with the General Services Administration. He said the project is the largest metric construction contract ever in the United States, and currently is 95% complete. He said there

hasn't been any extra costs or problems due to the metric requirements.

Mr. David Wright, Vice President of United Masonry Inc. of Virginia, said his organization's first metric project is currently underway, and it was awarded at 1% below government cost estimates. He explained that the layout process using metric dimensions is actually simpler because metric uses a base measurement of ten units. He added that if they had used "soft metric" in their current project, the cost of cutting the "soft metric" blocks, so they would fit around the "hard metric" door frames, would have exceeded any material cost premium from switching to metric.

Ms. Lorelle Young, President of the U.S. Metric Association, testified that Congressional interference will only impede the conversion to metrics. Instead of addressing the problem it is attempting to solve, she stated, that H.R. 2779 is "overkill" and attempts to regulate all construction products used in federal construction projects. She explained that there are exceptions within the current law, they just need to be discussed and used.

4.5(q)—The Increasing Importance of International Standards to the U.S. Industrial Community and the Impact of ISO 14000

June 4, 1996

Hearing Volume No. 104-52

Background

On June 4, 1996, the Subcommittee on Technology held a hearing entitled, "The Increasing Importance of International Standards to the U.S. Industrial Community and the Impact of ISO 14000." Effectively managing standardization policies can reduce trade barriers, increase profitability, and ensure a company's competitiveness. The International Standards Organization (ISO) is a non-governmental, worldwide organization, which develops voluntary, international standards. In 1993, ISO began constructing ISO 14000, a series of environmental management standards which provide business managers with a structure for managing environmental impacts.

The hearing consisted of one panel. Witnesses included representatives from the government, standards developing organizations, and industry. Witnesses provided testimony regarding the international standards developing process. In addition, witnesses compared the development of ISO 9000 versus the development of ISO 14000.

Summary of hearing

Mr. Joseph Cascio, Vice President of Global Environment Technology Foundation, testified that ISO 14000 is a new approach to environmental protection. He explained that it expects organizations to take responsibility for their environmental aspects, rather than being directed by government agencies under the current command and control system. He said that all employees must be trained to exercise environmental care, and implementation requires top management involvement. He stated that making small

and medium-sized firms aware of ISO 14000 is his biggest concern. He explained that the standards were developed so they could be tailored for any size of organization, and that they, could in fact, have greater benefit for small and medium- sized firms because they have the greatest amount to lose from costly and inefficient systems.

Dr. Belinda Collins, Director, Office of Standards Services at the National Institute of Standards and Technology, testified that NIST is committed to working with the private sector and other agencies to ensure the United States develops international standards that meet our needs. She stated that the United States can expect harmonization of global standards and the free flow of goods, only by participating vigorously in the development of international standards. She said the United States was successful in getting the development of an international environmental management system standard by realizing early that environmental management systems were being developed in Europe and that they had the potential to be barriers to trade. She concluded that with broad participation of the United States, good relations between the public and private sector, and the close cooperation of other interested bodies, ISO 14000 can develop into a series of truly international standards.

Mr. Sergio Mazza, President of the American National Standards Institute (ANSI), stated that ANSI's international goal is to promote global standards that reflect U.S. interests. He testified that ANSI is the U.S. representative to the two major non-treaty international standards organizations: the International Standards Organization (ISO), and the International Electrotechnical Committee (IEC). He said the U.S. TAG's primary purpose is to develop and transmit via ANSI, the U.S. position on activities and ballots for ISO 14000. He explained that the U.S. TAG has more than 550 participants from both the public and private sectors, from large and small organizations. He detailed a variety of possible impacts ISO 14000 could have on U.S. business: organizations could better manage their environmental efforts and show a commitment to environmental protection, insurance companies may lower premiums for those who have implemented the standard, it may become a condition of doing business in Europe, and standard implementation may factor into regulatory relief programs.

Mr. James Thomas, President for the American Society of Testing and Materials (ASTM), stated that ASTM is one of the largest standards developing organizations in the world. He explained that ASTM administers the TAG to TC 207, the Technical Committee which is developing ISO 14000. He said the TAG's they have administered have had some good and some bad experiences with the ISO process. He said that voting within ISO is one nation, one vote and that Europe has 15 votes to our one, therefore, some standards coming out of ISO are based on European, not American, technology. He also said that many of the TAG members believe some ISO standards are based on political, not technical considerations. He added that U.S. industry should determine what standards developing process works for them, not the U.S. government. He said he believes ISO will be successful if three industry requirements are met: (1) their technical content is such that it actually leads to

a reduction in the environmental pollution; (2) they offer a way for U.S. industry to meet all government environmental obligations under one program; and (3) they can be implemented at a reasonable cost.

Ms. June Ling, Associate Executive Director of the American Society of Mechanical Engineers (ASME), testified that the ISO process is not the only means of developing international standards. She also recommended that the U.S. government consider facilitating the international recognition of U.S. technology through some underwriting of the distribution of U.S. consensus-based standards.

Mr. Gerald Ritterbusch, Manager of Product Safety at Caterpillar, Inc. testified that as a global manufacturer, international standards are very important to his company's ability to market and service products around the world. He explained that ISO 9000 is a good standard, but that those who had the opportunity to make a profit from the standard, such as the registrars, made a strong push that organizations had to be registered to market their products. He said that the U.S. interests learned a lesson from ISO 9000, and therefore there has been active participation of U.S. industry in developing ISO 14000. He said that it is imperative we do not let the registration/certification community drive ISO 14000 like it did ISO 9000.

Mr. Steven Bold, Manager Environmental Compliance Group at Continental Circuits Corp., stated that his organization is a member of the Institute of Packaging Electronics Circuits (IPC)—a 2,100 member organization that includes many small companies which manufacture printed circuit boards. Mr. Bold stated that certification will improve his company's environmental compliance, help identify waste elimination and reduction opportunities, reduce potential environmental liabilities, and improve the company's environmental ethics. He strongly supports allowing companies to self-certify their environmental management systems with ISO 14000 standards. Mr. Bold said third-party certification is extremely costly and would likely preclude small businesses from participating in ISO 14000.

4.5(r)—Patent System and Modern Technology Needs: Meeting the Challenge of the 21st Century

June 6, 1996

Hearing Volume No. 104-54

Background

On June 6, 1996, the Subcommittee on Technology held a hearing entitled, "Patent System and Modern technology Needs: Meeting the Challenge of the 21st Century," to review the Patent and Trademark Office's (PTO) outline for incorporating technology into the reengineering plan thereby reducing the time, manpower, and applicant costs involved with the typical patent application. Testimony regarding the PTO's ability to identify and meet the future needs of applicants was received from the Patent Commissioner and industry representatives.

The hearing was divided into two panels. The first panel consisted of Patent Commissioner Bruce Lehman. He testified about the current situation the patent office faces as it enters the 21st Century. Panel two consisted of industry witnesses who provided testimony about the much need changes in the patent system.

Summary of hearing

Panel 1

Bruce Lehman, Patent Commissioner, testified that in order to meet patent applicant needs, the PTO has to design a better patent procedure to deal with the increased work load (up 13% last year) and decreased personnel. The following are the initial steps in the PTO reengineering plan: (1) Reduce the PTO processing time to 12 months or less for all inventions; (2) Establish industry sectors within the patent core; (3) Receive applications and publish patents electronically; (4) Exceed the quality expectations of the customer; and (5) Assess the fees that are commensurate with the services provided, depending on customer efficiency. He stated that by implementing these changes the PTO will be able better meet the rapidly changing needs of various technology fields. Even if the unions do not want the change, he stated that change is inevitable if the PTO is to continue operations. Maintaining global respect for American intellectual property is a constant process and he testified that the PTO does everything within its power to protect intellectual property rights of patent holders. Although the number of submarine patents is small, he testified that they are an immense problem that cause enormous damage to thousands of legitimate business people, as well as drain our economy.

Panel 2

Mr. David Ostfeld, Attorney, Chamberlain, Hrdicka, White, Johnson, and Williams, testified that one of the biggest dangers industry faces is the copying of intellectual property. He stated that the system needs to offer immediate protection to inventors thereby letting those competitors who wish to be in the marketplace a chance to independently develop. He said submarine patents are surprises, and for American businesses surprise is much worse then letting somebody get a couple of extra years on their patent. The PTO, he said, needs to focus more on the real users of the system—those who use the final patents.

Mr. Mike Gruchalla, Inventor, AlliedSignal, stated that small inventors have to "make a trade-off between completely protecting the product, or making a timely market entry." He testified the PTO needs to make the cost of obtaining a patent more consistent with the overall value of the patent in the marketplace. To assist inventors, he said, the PTO should let inventors file for patents electronically, and then publish patents electronically.

Mr. Mauro Togneri, Vice President, MTS Systems Corporation, testified that the cost of protecting their intellectual property has become a high priority. His company estimates that a patent will cost them $100,000. The biggest expense will be covering the patent in foreign countries. He stated that foreign competitors have made identical copies of MTS's products and there was no way for

them to protect it because of "the cost and time it takes to get a patent would have exceeded the value of the patent in the final analysis." He encouraged the PTO to expand their negotiations with other countries so patent applicants get more uniform coverage for less money.

4.5(s)—Environmental Regulation: A Barrier to the Use of Environmental Technology

June 20, 1996

Hearing Volume No. 104-63

Background

The Subcommittee on Technology and the Subcommittee on Energy and Environment held a joint hearing entitled, "Environmental Regulation: A Barrier to the Use of Environmental Technology," to receive testimony from the Environmental Protection Agency (EPA) and representatives of the environmental industry on legal and regulatory barriers to the development and use of high technology products developed to protect and improve the environment. (See also page 182.) The discussion included suggestions for statutory and regulatory improvements that will allow EPA to increase the number and frequency of innovative technologies used in environmental protection and restoration. Testimony was presented by one panel.

Summary of hearing

Mr. David M. Gardiner, Assistant Administrator for Policy, Planning and Evaluation for the United States Environmental Protection Agency, testified that EPA has already initiated significant changes to reduce regulatory and policy barriers and increase incentives for technology innovation, without compromising environmental protection.

Mr. Gardiner emphasized that innovative technologies benefit not only the environment, but also U.S. industry. According to Mr. Gardiner, the U.S. environmental industry accounts for annual revenues of $134 billion and demand for environmental technologies is projected to reach $300 to $500 billion annually by 2000. However, he expressed concern that the United States could be left behind in the world environmental technology market if it does not strengthen its own position by enacting reforms to promote the development of new technologies. Mr. Gardiner indicated current internal and external impediments to the domestic market which include statutes, regulations, policies and procedures that favor the use of conventional, often less efficient or cost-effective technologies; reluctance on the part of private industry and the financial community to fund the development of new technologies; inability to obtain credible, independently verified data on the performance and cost of promising new technologies; and the lack of established information networks that provide users with awareness of (and easy access to) better, cleaner, safer and lower-cost technologies.

Above all, Mr. Gardiner emphasized the importance of removing EPA's "prescriptive" environmental policy framework and building a successful partnership between government and industry for flexible, performance-based regulations. He explained EPA's Project XL will provide the cornerstone to streamlining the current system. Mr. Gardiner indicated support for the performance-based standards approach, like that mandated as part of the Clean Air Act, but opposes new legislation to reach that goal. Instead, he encouraged $80 million in funding for the ETI in FY97. According to Mr. Walter Kovalick, Director of Technology Innovation for the Office of Solid Waste and Emergency Response, the ETI's purpose is to provide project grants aimed at changing the infrastructure to encourage states to issue permits for use of innovative technologies.

Mr. John Urh, Sales and Marketing Manager for CETAC Technologies, Inc., testified on the importance of stimulating the development and use of new environmental technologies for environmental measuring and monitoring. Mr. Uhr indicated that although analytical monitoring methods continue to improve, the current approval system inhibits and delays the use of new monitoring technologies. According to Mr. Uhr, the approval system currently requires compliance with highly detailed EPA methods which often specify the use of specific procedures and analytical instrumentation. He emphasized that if the prescribed methods are not followed precisely, results will not be acceptable to auditors, the company or municipality which has contracted the test, the state environmental agency or the EPA regional and national offices. Mr. Uhr suggested more reliance on a target, instead of "cookbook" style methods, to reach an environmental goal with the most effective instrumentation and techniques. Mr. Uhr stated that adopting a performance-based system will allow EPA personnel to focus on truly new technology and the scientific quality of data. In addition, he echoed the environmental technology industry's contention that performance-based methods will increase laboratory productivity, improve the quality of testing and data, speed decision making based on monitoring, and reduce overall environmental monitoring and compliance costs. Mr. Uhr further explained that performance-based methods will increase the export market for U.S. environmental products and reduce the burden on the states for reviewing data. He commended EPA's efforts to evaluate the use of performance-based monitoring methods to replace the current system, but noted there is inconsistency among the program offices and no deadline for completing a review of the benefits of converting to a performance-based system or how that transition should be accomplished.

Mr. Uhr encouraged legislation to ensure coordination and uniformity across all environmental programs and to address issues related to the administration, enforcement, education and acceptance of the new system.

Ms. Jan Power, President of Power and Associates Corp., testified in support of the establishment of a strong national policy, as well as removal of regulatory barriers, to foster innovative technologies and prevent the development of American technologies by foreign competitors. She expressed concern that neither currently pending laws, nor the statutory and regulatory reforms relating to

hazardous wastes, will improve or facilitate the research, development and commercialization of innovative environmental technologies in the United States. Ms. Power highlighted reform options which will benefit the environment and encourage innovative technologies including elimination of RCRA technical and procedural standards for site remediation; opening of the voluntary cleanup market of 500,000 sites; enhanced lender liability to attract new capital into the market; and remedy selection reforms based on reasonably anticipated risks and actual or planned land use. In addition, she encouraged site-specific flexibility to select the best environmental technology "without any pre-determined, absolute mandate choice that does not incorporate the facts." In support of performance-based monitoring, Ms. Power cited a recent National Academy of Sciences study reporting that EPA and other federal agencies involved in analytical work need to move from an "all-or-nothing equivalency approach to a screened iterative approach." Ms. Power recommended earmarking significant portions of cleanup funds to speed the pace of cleanup and create incentives for the development of innovative environmental technologies. She also encouraged more reliance upon professional peer review organizations to prevent an anti-competitive environment favoring only a few vendors commercializing their new technologies.

Mr. Peter A. Carroll, Vice President for Government Affairs at Solar Turbines, Inc., testified on behalf of the National Association of Manufacturers and addressed the multiple layers of environmental regulation and bureaucratic rigidity stifling the development of new environmental technologies. According to Mr. Carroll, the permitting process lacks certainty at the state level where companies must make a significant investment preparing and submitting a proposal for approval.

He explained consulting businesses and entire law firm departments are employed to work through the complicated application process consuming capitol that could be invested in cleanup technologies. From the application process, indicated Mr. Carroll, a proposal goes through a lengthy review process at EPA during which many application are returned with recommendations for alternative technologies, different equipment, or even different sizes. According to Mr. Carroll, the rigidity of the current process, as well as concepts such as the best available control technology (BACT) and lowest achievable emission rate (LAER), resist the application of new technologies and should be reviewed. He recommended a regulatory system requiring compliance with reasonable environmental standards that will allow investors to select technologies and submit applications with a better understanding of when their investment can truly go to work. Mr. Carroll pointed out that in the past environmental regulators have relied upon quick-fix cleanup devices that rapidly reduce overall emissions to comply with clean air standards, but indicated that these approaches can be extremely costly with little or no environmental gain. Further, he explained that although the remaining air pollution problems require use of cheaper, reliable, common sense technologies, successful quick-fix cleanup devices remain an obstacle to new technologies of potential benefit to the United States and throughout the ever-increasingly industrialized world. In addition to problems with the

approval process for innovative technologies, Mr. Carroll highlighted the lack of coordination between Department of Energy (DOE) energy efficiency and conservation programs and EPA standards. He emphasized that Clean Air Act goals and requirements should be directly connected to a national energy strategy.

4.5(t)—Oversight Review of Research Laboratory Programs at the National Institute of Standards and Technology

June 25, 1996

Hearing Volume No. 104-62

Background

On June 25, 1996, the Subcommittee on Technology held the third in a series of hearings to receive testimony regarding the NIST laboratory programs. The hearing, entitled, "Oversight Review of Research Laboratory Programs at the National Institute of Standards and Technology," reviewed NIST's mission of promoting the nation's economy by working with industry to develop technology, measurements, and standards. This hearing focused on evaluating Computer Systems Laboratory (CSL)/Computer and Applied Mathematics Laboratory (CAML) and the Electronics and Electrical Engineering Laboratory (EEEL) by examining each in a separate panel.

Testimony was presented in two panels representing the respective laboratories.

Summary of hearing

Panel 1

Dr. Shukri Wakid, Director, Information Technology Laboratory, National Institute of Standards and Technology, testified that by working to identify and prioritize industry's needs, NIST takes on a unique role that industry does not provide by developing tests to establish the commercial merit of research areas. He stated that the tests which NIST develops are open and pre-competitive. The tests are used to cross-evaluate research, therefore, industrial researchers use NIST as a neutral technical ground to establish the merit of their work.

Dr. Ralph Z. Roskies, Chair, National Research Council Panel for Information Technology, stated that the formal standards process seems to move too slowly in the information technology arena to be useful. He stated that NIST is moving from developing standards to conformance testing. This is a recognition of where NIST can play a useful role.

Dr. Charles N. Brownstein, Executive Director, Cross-Industry Working Team Corporation for National Research Initiatives, testified that most industries focus more on development than research, thereby, encouraging NIST and other federal agencies to support basic research or a neutral role. He testified since the United States is the only country that does not have a strategic single representative that works for our interest in international standards,

it is better to have the technical people at NIST playing that role than diplomatic people attempting to play the role.

Dr. Robert E. Hebner, Acting Deputy Director, National Institute of Standards and Technology, testified that EEEL work is: laboratory-based, global, highly leveraged, unique, and industry focused. He stated that NIST's role is to look at what industry intends to do technically and help them make the desired advances.

Dr. V. Thomas Rhyne, Chair, National Research Council Panel for Electronics and Electrical Engineering, stated that although the project manager has many ideas, resources are consistently inadequate to pursue them all. In spite of this, he was impressed with NIST's decision making process. He expressed concern that critical areas of national importance may be missed in less-organized industries.

Dr. James A. Glaze, Vice President, Technology Programs, Semiconductor Industry Association, testified that Roadmaps have proven to be essential for his industry despite concerns that Roadmaps may overly structure the future and stifle creativity. His industry primarily lays out the requirements and the needs as opposed to the methods. He stated that to remain competitive companies must participate at the pre-competitive level since single company can not do by itself. Individual companies develop a competitive advantage based on design and performance.

4.5(u)—Solving the Year 2000 Computer Problem

September 10, 1996

Hearing Volume No. 104-67

Background

On September 10, 1996, the Subcommittee on Technology, and the Committee on Government Reform and Oversight, Subcommittee on Government Management, Information, and Technology, held a joint hearing entitled, "Solving the Year 2000 Computer Problem," to receive testimony assessing the efforts made by states to address the year 2000 computer problem in state government systems, and to obtain a status report from the Office of Management and Budget on the ongoing efforts of federal agencies to address the problem. Computer experts and software industry representatives presented testimony on the extent to which personal computer systems will be affected by the year 2000 problem and the solutions available to personal computer users. The hearing was structured in two panels.

Summary of hearing

Panel 1

Mr. Harris Miller, President, Information Technology Association of America (ITAA), testified that the Year 2000 software conversion is the largest and most complex global information management challenge society has ever faced. He stated that ITAA's Year 2000 Task Force has been working with federal, state, and local government agencies, and the private sector here and abroad to educate

and help get started with the conversion programs. The first problem, he stated, is getting the attention of top management and making them understand the consequences of not addressing this issue immediately. As an example, he cited the efforts made by the securities industry to address this as a manageable problem. He noted that the testing phase is what increases the cost of fixing the line of code. When he described ITAA's certification program for personal computers and software, he noted that personal computers were a minor problem that could be easily fixed.

Mr. Daniel D. Houlihan, First-Vice President and President-Elect, National Association of State Information Resources Executives (NASIRE), testified that his organization has surveyed its members and discovered that all states are actively engaged in solving the computer problem. 25% reported they are already testing plans and implementing system changes. He stated the cost dimension of overhauling the state computer systems, which have between 300,000 to 97 million lines of code to convert, is proving to be most challenging. He noted that the state of Nebraska has added a 2 cent cigarette tax which will be used to correct the dilemma. He emphasized the need to have the Federal Government communicate to the states through a single mean such as the Chief Information Officer (CIO) in each agency. For example, the CIO of the Federal Department of Transportation (DOT) would communicate with the CIO of the State DOT.

Mr. Larry Olson, Deputy Secretary for Information Technology, Commonwealth of Pennsylvania, testified that states can not get distracted by the technical dimension of this challenge and miss the fact that this is a project management challenge. He stated that the states must make an effort to raise the awareness among the local governments, businesses and citizens in order to thoroughly address the problem. He testified that the three guiding principles that Pennsylvania has enacted to correct the dilemma are leadership, management, and education.

Panel 2

Ms. Sally Katzen, Administrator of Office Information and Regulatory Affairs, Office of Management and Budget (OMB), testified that it would be difficult for OMB to provide a comprehensive report by the November 1 deadline imposed by the House Treasury, Postal Service and General Government Appropriations Report. She stated that more time was needed to assess all federal agencies progress in addressing the Year 2000 issue. She estimated that by February, with the regular budget submissions, all agencies would have actual figures available. Chief Information Officers of each agency, she stated, will be responsible for fixing the Year 2000 problem in their agency.

4.5(v)—Technological Advances in Genetics Testing: Implications for the Future

September 17, 1996

Hearing Volume No. 104-68

Background

On September 17, 1996, the Subcommittee on Technology held the first House hearing on genetics testing in the 104th Congress. The hearing, entitled, "Technological Advances in Genetics Testing: Implications for the Future," focused on the quality assurance of the testing procedures, accuracy standards for the testing, and future implications for its use. Testimony was received from three panels.

Summary of hearing

Panel 1

Congressman Cliff Stearns, (R-FL), testified that he introduced H.R. 2690, the "Genetic Privacy and Nondiscrimination Act," to prevent discrimination based on a person's genetic profile. He stated that genetic information must not be used or misused to deny access to health insurance. The bill will establish guidelines concerning disclosure and the use of genetic information.

Congresswoman Nancy L. Johnson, (R-CT), testified that if people learn their genetic status they can look for early signs of illness or disability and take preemptive action to minimize the onset of illness. She stated that people should not fear losing their health care coverage when they need it the most.

Congresswoman Louise M. Slaughter, (D-NY), testified that genetic research and therapy hold the promise to eradicate some of the most terrible and feared diseases know to humanity. However, the potential for misuse and abuse of this information is staggering. For these reasons, she introduced H.R. 2748, the Genetic Information Nondiscrimination in Health Insurance Act. She stated that this legislation will forbid insurance companies from denying or canceling insurance, and of changing the rates and conditions of policies based on genetics.

Panel 2

Dr. Francis S. Collins, Director, National Center for Human Genome Research, National Institutes of Health, testified that until scientific knowledge is sufficient to ensure that the benefits exceed the risks, the clinical use of genetic testing should remain in a research area. Unless the test results are interpreted correctly, he stated, it is not wise to test individuals. He stated that laboratory testing has been going on for quite some time but the recent interest in genetic testing has been fostered because it is a predictive test that allows you to test the family, not just the individual.

Ms. Mary Pendergast, Deputy Commissioner, Senior Advisor to the Commissioner, Food and Drug Administration, testified that the FDA currently has minimal involvement with genetic testing. She stated that FDA regulates the safety and effectiveness of diagnostic tests traditionally manufactured and commercially marketed

as finished products, but in-house developed tests have not been actively regulated by the FDA.

Panel 3

Ms. Carol Krause, Cancer Survivor, testified that one of the most important questions to ask with respect to the genetic testing issue is: "Will the information from a genetic test help me make decisions to reduce my risk of getting cancer? And, if not, will it reduce my risk of dying from cancer?" Although more data on the accuracy of tests is needed, she believes that genetic testing should be more widely available, in an appropriate laboratory setting, and not burdened by the FDA. She stated that genetic tests are tools that will help increase the odds.

Ms. Karen Rothenberg, Director, Law & Health Care Program, University of Maryland, School of Law, testified that as new genetic tests proliferate, policy makers need to evaluate the development of legislative and regulatory strategies to address the concerns of discrimination. She questioned how the research community can ensure the public that these tests have value. She stated that genetic testing doesn't mean that more people have genetic disorders, it just means we can pinpoint the malignancies we know something about.

Dr. Wayne Grody, UCLA School of Medicine, Member, NIH-DOE Task Force on Genetic Testing, testified that it would be difficult for federal regulations to completely assure quality and appropriateness of all genetic testing since it is such a rapidly changing technical area. He stated that acceptance, validation, and appropriate use of new tests should be left primarily to professional scientific peer groups, with FDA oversight of safety and effectiveness of manufactured test devices.

Dr. Alan Goldhammer, Director, Technical Affairs, Biotechnology Industry Organization (BIO), testified that BIO supports laws and policies that ensure products have value to patients and health care providers. BIO also believes oversight under the Clinical Laboratory Information Amendments (CLIA) can be strengthened by incorporating the guidelines that have been drawn up by professional scientific societies with expertise in the field of genetics and molecular biology.

Ms. Christine Brunswick, Vice President, Breast Cancer Coalition, testified that there is a need to educate consumers, health care providers, and at-risk patient groups. She noted that the National Breast Cancer Coalition has made science education a priority. The Coalition believes that testing should be regulated by the FDA, and until sensitivity, specificity, and predictive values of the test are known, the FDA should not approve the testing.

Dr. Jeffrey Cossman, Georgetown University Medical Center, Member of Federation of American Societies for Experimental Biology (FASEB), American Society for Investigative Pathology (ASIP) testified that strict quality assurance is needed to protect patient safety. In order to ensure public safety, national standards would be the best to regulate genetic testing, regardless of which agency does it. He explained the differences between genetic tests which reveal genetic components as compared to tests which reveal inherited components. How these test results are interpreted is very different. He stated that genetic testing can be assured through existing programs by extension of new regulations and on-site inspection of genetic tests.

NOTE: Committee Prints and Hearings may be purchased from the Superintendent of Documents, Congressional Sales Office—Main GPO, Washington, D.C. 20402-9325. Telephone orders may be placed by calling the Congressional Desk at (202) 512-1808. You may also fax your request by dialing (202) 512-2250. Bills and Legislative Reports may be ordered through the House Document Room (202) 225-3456.

COMMITTEE PUBLICATIONS

HEARINGS

DATE	TITLE	PUBLICATION NO.
Jan. 6, 1995	Is Today's Science Policy Preparing Us For The Future? (Hearing before the Committee on Science)	1.
Feb. 1, 1995	H.R. 655—The Hydrogen Future Act of 1995 (Hearing before the Committee on Science)	2.
Jan. 31, 1995 Feb. 3, 1995	Risk Assessment and Cost Benefit Analysis (Hearing before the Committee on Science)	3.
Feb. 14, 1995	Cholesterol Measurement: Error and Variability (Hearing before the Subcommittee on Technology)	4.
Mar. 23, 1995	FY 1996 TA/NIST Budget Authorization (Hearing before the Subcommittee on Technology)	5.
Feb. 22, 1995 Mar. 2, 1995	The 1996 National Science Foundation Authorization (Hearing before the Subcommittee on Basic Research)	6.
Mar. 16, 1995	FY 1996 National Fire Administration Authorization (Hearing before the Subcommittee on Basic Research)	7.
Feb. 13, 1995 Mar. 16, 1995	Fiscal Year 1996 NASA Authorization - Feb. 13, 1995 (also contains) NASA The Outside Opinion - Mar. 16, 1995 (Hearing before the Subcommittee on Space and Aeronautics)	8.
May 16, 1995	Federal Aviation Administration Research and Acquisition Management (Hearing before the Subcommittee on Technology)	9.
Feb. 13, 14, 15, 16, 21, 1995	FY 1996 DOE, EPA, and NOAA R&D Budget Authorizations (Hearing before the Subcommittee on Energy and Environment)	10.
Mar. 9, 1995	Alternative Futures for the Department of Energy National Laboratories "The Galvin Report" and National Laboratories Need Clearer Missions and Better Management, A GAO Report to the Secretary of Energy (Joint Hearing before the Subcommittee on Basic Research and the Subcommittee on Energy and Environment)	11.
Jun. 29, 1995	Maintaining Our International Competitiveness: The Importance of Standards and Conformity Assessment on Industry (Hearing before the Subcommittee on Technology)	12.
Jun. 27, 1995	Federal Technology Transfer Policies and Our Federal Laboratories: Methods for Improving Incentives for Technology Transfer at Federal Laboratories (Joint Hearing before the Subcommittee on Technology and the Subcommittee on Basic Research)	13.
Jun. 28, 1995	Restructuring The Federal Scientific Establishment (Hearing before the Committee on Science)	14.
Jun. 15, 1995	NIST Industrial Technology Services Authorization Act of 1995 (Markup before the Subcommittee on Technology)	15.

HEARINGS

DATE	TITLE	PUBLICATION NO.
Jul. 26, 1995	Cyberporn: Protecting Our Children From The Back Alleys of the Internet (Joint Hearing before the Subcommittee on Basic Research and the Subcommittee on Technology)	16.
Jun. 1, 1995	Science, Environment, and Technology Summit: A Long Term National Science Strategy (Field Hearing held in Oak Ridge, Tennessee, before the Subcommittee on Basic Research)	17.
Sept. 28, 1995	The Impact of Government Regulatory Tax and Legal Policy (Hearing before the Subcommittee on Technology)	18.
Jul. 13, 1995	Reshaping the Graduate Education of Scientists and Engineers: NAS's Committee on Science, Engineering, and Public Policy Report (Hearing before the Subcommittee on Basic Research)	19.
Sept. 27, 1995	The Space Shuttle Program in Transition: Keeping Safety Paramount (Hearing before the Subcommittee on Space and Aeronautics)	20.
Oct. 18, 1995	The Malcolm Baldrige National Quality Awards Program: An Oversight Review From Its Inception (Hearing before the Subcommittee on Technology)	21.
Oct. 19, 1995	U.S.-Japanese Cooperation in Human Spaceflight (Hearing before the Committee on Science)	22.
Oct. 12, 1995	Educational Technology In The 21st Century (Joint Hearing before the Committee on Science and the Committee on Economic and Educational Opportunities)	23.
Sept. 12, 1995	Restructuring The Federal Scientific Establishment: Dismantling Of The Department Of Commerce (Hearing before the Committee on Science)	24.
Oct. 17, 1995	Next Generation Weather Radar (NEXRAD): Are We Covered? (Hearing before the Subcommittee on Energy and Environment)	25.
Nov. 2, 1995	Medical Technology Development and Commercialization (Hearing before the Subcommittee on Technology)	26.
Nov. 9, 1995	The Space Shuttle Program In Transition: Keeping Safety Paramount, Part II (Hearing before the Subcommittee on Space and Aeronautics)	27.
Nov. 1, 1995	The X-33 Reusable Launch Vehicle: A New Way Of Doing Business? (Hearing before the Subcommittee on Space and Aeronautics)	28.
Oct. 24, 1995	The National Earthquake Hazards Reduction Program (Hearing before the Subcommittee on Basic Research)	29.
Sept. 7, 1995	Joint Hearing: Restructuring the Federal Scientific Establishment: Future Missions and Governance for the Department of Energy National Labs (H.R. 87, H.R. 1510, H.R. 1993—Title II, and H.R. 2142) (Joint Hearing before the Subcommittee on Basic Research and the Subcommittee on Energy and Environment)	30.
Sept. 20, 1995	Scientific Integrity and Public Trust: The Science Behind Federal Policies and Mandates: Case Study 1--Stratospheric Ozone: Myths and Realities (Hearing before the Subcommittee on Energy and Environment)	31.
Oct. 31, 1995	The High Performance Computing and Communications Program (Hearing before the Subcommittee on Basic Research)	32.
Nov. 8, 1995	NASA Procurement in the Earth-Space Economy (Hearing before the Committee on Science)	33.

HEARINGS

DATE	TITLE	PUBLICATION NO.
Nov. 9, 1995	DOE National Laboratory Restructuring (H.R. 884, to authorize appropriations for a retirement incentive for certain employees of National Laboratories and H.R. 2301, to designate an enclosed area of the Oak Ridge National Laboratory in Oak Ridge, Tennessee as the "Marilyn Lloyd Environmental, Life, and Social Sciences Complex.") (Hearing before the Subcommittee on Basic Research)	34.
Nov. 16, 1995	Scientific Integrity and Public Trust: The Science Behind Federal Policies and Mandates: Case Study 2—Climate Models and Projections of Potential Impacts of Global Climate Change (Hearing before the Subcommittee on Energy and Environment)	35.
Nov. 30, 1995	Determinations and Findings for the Space Shuttle Program (Hearing before the Subcommittee on Space and Aeronautics)	36.
Dec. 6, 1995	Superfund Research and Development: The Role of R&D Within A Reformed Superfund (Hearing before the Subcommittee on Energy and Environment)	37.
Dec. 7, 1995	An Industry Perspective On FAA R&D Programs (Hearing before the Subcommittee on Technology)	38.
Dec. 13, 1995	Scientific Integrity and Federal Policies and Mandates: Case Study 3— EPA's Dioxin Reassessment (Hearing before the Subcommittee on Energy and Environment)	39.
Sept. 14, 1995	H.R. 1756, The Department of Commerce Dismantling Act (Markup before the Committee on Science)	40.
Apr. 16, 1996	Technology Administration/National Institute of Standards and Technology Fiscal Year 1997 Authorization (Hearing before the Subcommittee on Technology)	41.
Apr. 18, 1996	H.R. 3060, The Antarctic Environmental Protection Act of 1996 (Hearing before the Committee on Science)	42.
May 2, 1996	Hearing: Oversight Review of Research Laboratory Programs at the National Institute of Standards and Technology (Hearing before the Subcommittee on Technology)	43.
Feb. 28, 1996	Allocating Federal Funds for Science and Technology (Hearing before the Committee on Science)	44.
Mar. 22, 1996	National Science Foundation FY 1997 Authorization (Hearing before the Subcommittee on Basic Research)	45.
Apr. 18, 1996	Federal Aviation Administration Research, Engineering, and Development Fiscal Year 1997 Authorization and Management Reform (Hearing before the Subcommittee on Technology)	46.
Mar. 19, 1996	Partnership for Advanced Computational Infrastructure Program (Hearing before the Subcommittee on Basic Research)	47.
May 14, 1996	Solving the Year 2000 Software Problem: Creating Blueprints for Success (Hearing before the Subcommittee on Technology)	48.
Mar. 6, 1996	U.S. Global Change Research Programs: Data Collection and Scientific Priorities (Hearing before the Committee on Science)	49.
May 16, 1996	Proposed Amendments to the Metric System Conversion Act (Hearing before the Subcommittee on Technology)	50.
Mar. 28, 1996	FY 1997 NASA Posture Hearing (Hearing before the Subcommittee on Space and Aeronautics)	51.

HEARINGS

DATE	TITLE	PUBLICATION NO.
Jun. 4, 1996	The Increasing Importance of International Standards to the U.S. Industrial Community and the Impact of ISO 14000 (Hearing before the Subcommittee on Technology)	52.
Mar. 7, 1996	The Department of Energy's Restructured Fusion Energy Sciences Program (Hearing before the Subcommittee on Energy and Environment)	53.
Jun. 6, 1996	Patent System and Modern Technology Needs: Meeting the Challenge of the 21st Century (Hearing before the Subcommittee on Technology)	54.
Mar. 27, 1996	Railroads Train Safety Technology (Joint Hearing before the Subcommittee on Technology and the Committee on Transportation and Infrastructure)	55.
Apr. 17, 1996	Fiscal Year 1997 NASA Authorization (Hearing before the Subcommittee on Space and Aeronautics)	56.
Feb. 29, 1996	National Weather Service Modernization Program Status (Hearing before the Subcommittee on Energy and Environment)	57.
May 2, 1996	Changes in U.S. Patent Law and Their Implications for Energy and Environment Research and Development (Hearing before the Subcommittee on Energy and Environment)	58.
Jun. 12, 1996	United States Space Launch Strategy (Hearing before the Subcommittee on Space and Aeronautics)	59.
Jul. 18, 1996	NASA's Uncosted Carryover (Hearing before the Subcommittee on Space and Aeronautics)	60.
Jul. 31, 1996	Space Commercialization Promotion Act of 1996 (Hearing before the Subcommittee on Space and Aeronautics)	61.
Jun. 25, 1996	Oversight Review of Research Laboratory Programs at the National Institute of Standards and Technology (Hearing before the Subcommittee on Technology)	62.
Jun. 20, 1996	Environmental Regulation: A Barrier To The Use Of Environmental Technology? (Joint hearing before the Subcommittee on Technology and the Subcommittee on Energy and Environment)	63.
Sept. 12, 1996	Life On Mars? (Hearing before the Subcommittee on Space and Aeronautics)	64.
Jul. 23, 1996	The Future of Antarctic Research (Hearing before the Subcommittee on Basic Research)	65.
May 8, 1996	The Department of Energy's FY 1997 Budget Request for the Office of Energy Research (OER) (Hearing before the Subcommittee on Energy and Environment)	66.
Sept. 10, 1996	Solving the Year 2000 Computer Problem (Hearing before the Subcommittee on Technology)	67.
Sept. 17, 1996	Technological Advances in Genetics Testing: Implications for the Future (Hearing before the Subcommittee on Technology)	68.
Jan. 25, 1996	Leveraging National Oceanographic Capabilities (Hearing before the Subcommittee on Energy and Environment)	69.
Mar. 14, 1996	U.S. Energy Outlook and Implications for Energy R&D (Hearing before the Subcommittee on Energy and Environment)	70.

HEARINGS

DATE	TITLE	PUBLICATION NO.
Apr. 17, 1996	FY 1997 Budget Authorization Hearing on DOE's Energy Efficiency and Renewable Energy and Fossil Energy Programs (Hearing before the Subcommittee on Energy and Environment)	71.
May 1, 1996	DOE's FY 1997 Budget Request for Environment, Safety and Health, Environment Restoration and Waste Management, and Nuclear Energy (Hearing before the Subcommittee on Energy and Environment)	72.
Jul. 10, 1996	Civilian Science Agencies' Implementation of the Government Performance and Results Act (Hearing before the Committee on Science)	73.
Jul. 23, 1996 Jul. 24, 1996	The Effects of a Six-Year Balanced Budget on Civilian Research and Development (Parts I and II) (Hearing before the Committee on Science)	74.
Jul. 30, 1996	Partnership for a New Generation Vehicle (PNGV) (Hearing before the Subcommittee on Energy and Environment)	75.
Mar. 21, 1996	FY 1997 DOE, EPA and NOAA Authorizations; and Safe Drinking Water Act Reauthorization (Hearing before the Subcommittee on Energy and Environment)	76.
Aug. 1, 1996	Funding DOE Research and Development in a Constrained Budget Environment (Hearing before the Subcommittee on Energy and Environment)	77.
Sept. 19, 1996	Technological Solutions to Improve Aviation Safety (Hearing before the Committee on Science)	78.

COMMITTEE PUBLICATIONS

REPORTS

DATE	TITLE	PUBLICATION NO.
Feb. 15, 1995	Job Creation and Wage Enhancement Act of 1995 (H.R. 9)	H.Rept. 104-33, Pt. 2
Mar. 30, 1995	Hydrogen Future Act of 1995 (H.R. 655)	H.Rept. 104-95
July 11, 1995	National Sea Grant College Program (H.R. 1175)	H.Rept. 104-123, Pt. 2
Jul. 21, 1995	Environmental Research, Development and Demonstration Authorization Act of 1995 (H.R. 1814)	H.Rept. 104-199
Jul. 28, 1995	International Space Station Authorization Act of 1995 (H.R. 1601)	H.Rept. 104-210
Aug. 4, 1995	National Science Foundation Authorization Act of 1995 (H.R. 1852)	H.Rept. 104-231
Aug. 4, 1995	American Technology Advancement Act of 1995 (H.R. 1870)	H.Rept. 104-232
Aug. 4, 1995	National Aeronautics and Space Administration Authorization Act, Fiscal Year 1996 (H.R. 2043)	H.Rept. 104-233
Aug. 4, 1995	Fire Administration Authorization Act of 1995 (H.R. 1851)	H.Rept. 104-235
Aug. 4, 1995	Department of Energy Civilian Research and Development Act of 1995 (H.R. 1816)	H.Rept. 104-236, Pt. 1
Aug. 4, 1995	National Oceanic and Atmospheric Administration Authorization Act of 1995 (H.R. 1815)	H.Rept. 104-237, Pt. 1
Dec. 7, 1995	National Technology Transfer and Advancement Act of 1995 (H.R. 2196)	H.Rept. 104-390
May 1, 1996	Omnibus Civilian Science Authorization Act of 1996 (H.R. 3322)	H.Rept. 104-550, Pt. 1
May 23, 1996	Antarctic Environmental Protection Act of 1996 (H.R. 3060)	H.Rept. 104-593, Pt. 1
June 26, 1996	Savings in Construction Act of 1996 (H.R. 2779)	H.Rept. 104-639
Sept. 17, 1996	Space Commercialization Promotion Act of 1996 (H.R. 3936)	H.Rept. 104-801, Pt. 1
May 1995	1996 NASA Authorization	A.
Apr. 1996	Science, Technology, and American Diplomacy 1995 - Joint Committee Print for the use of the Committee on Science and the Committee on International Relations (Sixteenth Annual Report Submitted to the Congress by the President Pursuant to Section 503(b) of Title V of Public Law 95-426.) This is the last year this document will be printed.	B.

○